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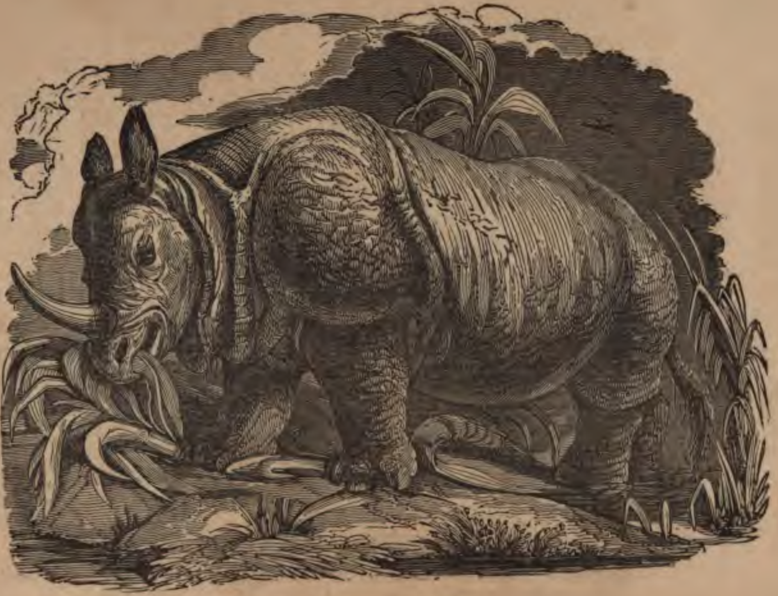

RHINOCEROS.

G. V. Pomeroy Jr.
New York.

Samuel Griswold Goodrich

PETER PARLEY'S pseud.
ILLUSTRATIONS OF

THE ANIMAL KINGDOM;
Beasts, Birds, Fishes, Reptiles and Insects.

BOSTON:
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INTRODUCTION.

In looking around upon the works of Nature, we observe that they are divided into three classes. The first consists of those which are endowed with life and possess the power of motion; these we call *Animals*. The second embraces those which possess a species of life, but are without the power of motion; these we call *Vegetables*. The third, including those that are motionless and without life of any kind, as stones and earths, we call *Minerals*.

These three classes constitute the *Three Kingdoms of Nature, Animal, Mineral, and Vegetable*. The scientific description of these is called *Natural History:* the first branch, the science of Animals, is called *Zoology;* and to this the following pages are devoted. The science of Vegetables is called *Botany;* the science of Minerals is called *Mineralogy*. Each of these is full of wonderful knowledge, and the more we know of them, the more interesting they become to us.

There is no branch of Natural History more delightful than that of Animals: their story is a perpetual tale of wonders. In looking casually upon a bee or spider, we are apt to think them stupid insects; but if we go to their hive or web, and study into their works, we shall be struck with never-ceasing admiration. There is in fact no living thing, which on due examination does not unfold to us the wonderful skill and knowledge of the great CONTRIVER of the world and its inhabitants.

Every person has remarked that some animals live on the land, some in the water, and that some soar aloft into the air. Those that live on the land, having four feet, are called quadrupeds, and are generally denominated Beasts; those which dwell in the waters, pass under the general title of Fishes. The science of these is called Ichthiology. The feathered tribe, which fly in the air, are called Birds, and the science of them is called Ornithology. The science of Insects is called Entomology.

On comparing different sorts of animals with one another, we find some to be alike in many respects, while in others, they differ. Thus on comparing a pig with a cat, we see that each has a head, and each has four feet; yet the head of one is long, the other round; and the feet of one are terminated with hoofs, and of the other, with claws. If we compare a bird with a dog, there is still a resemblance and a difference; they both have legs, and both move; yet one has four legs and is covered with hair, while the other has two legs only, and is dressed in feathers.

It is from such a comparison of animals, that a beautiful system of classification has been devised by the celebrated Linnæus, Baron Cuvier and others. This system collects into groups those animals which are alike, thus exhibiting at one view those which are allied by affinity, at the same time pointing out the differences which separate them. According to this system, the animal creation is divided into *Classes;* these classes into *Orders;* these orders into *Genera,* and these genera into *Species.* Thus, birds generally are a Class; the domestic fowls, turkeys, pheasants, partridges and quails are an Order; partridges, quails, &c. are a Genus; and quails are a Species.

You may better conceive of this arrangement and its utility in enabling us to take a clear view of the animal creation, by considering them all as put into one vast enclosure. On entering this, let us suppose that we find all the quadrupeds in one division; all the birds in another; all the fishes in another, and so on. In taking a closer view, suppose that we find subdivisions, not at first noticed, by which all the flesh-eating animals are put together in one pen, as bears, lions, foxes, dogs, &c.: and still again, suppose that we discover that all the bears are by themselves, all the lions by themselves, &c. This illustration will enable you to understand at once this matter of classification. I will now lay it before you; at first it may seem a mere list of hard names, but do not be discouraged: it is like a butternut, with a rough shell, enclosing a most delicious kernel. If you will go through this classification, so that you can tell to what class and order a horse, a cow or a hog belongs, I know it will be the source of great satisfaction to you hereafter.

The Animal Kingdom is separated into two grand Divisions:

THE FIRST DIVISION EMBRACES

VERTEBRATED ANIMALS, including man, quadrupeds, birds, reptiles and fishes. These are such as have bodies sustained upon a frame-work or skeleton of bones, including a backbone, or spine, and ribs. The spine is composed of vertebræ, or short bones, which move upon one another, and contain a portion of nervous matter, called marrow. In this division, the blood is always red, and the animals have all two eyes, two ears, and two nostrils.

THE SECOND DIVISION EMBRACES

INVERTEBRAL ANIMALS, as snails, oysters, worms, insects, polypi, &c. They are destitute of the bony skeleton, or spine and ribs. They are generally small, but constitute by far the most numerous portion of living things. Some have the body protected by shells, and some are only covered by a soft skin. None of these have all the organs of sense; some are destitute of sight, or taste, or smell; with a few exceptions they have not red blood. Many have not the power to move, but remain fixed in one spot for life. They have little intelligence, but wonderful powers of instinct.

The First Division, including Vertebrated Animals, is subdivided into four Classes, as follows:

Class 1. MAMMALIA, including Man, Apes, Quadrupeds, Seals, and the cetaceous fishes, as the Whale, Grampus, &c. It includes all those creatures that suckle their young ones. They are the highest class of animals, having the most numerous faculties, the finest organs and sensations, and the most varied powers of motion.
Class 2. AVES, or BIRDS, includes the whole feathered tribe.
Class 3. REPTILIA, or REPTILES, includes Tortoises, Lizards, Serpents, Frogs, Toads, Salamanders, the Proteus, and Siren.
Class 4. PISCES, or FISHES, includes the Eels, Sharks, Sturgeon, Salmon, Perch, &c.: all having red, cold blood: moving themselves by fins.

The Second Division, including Invertebral Animals, is subdivided into fourteen Classes, as follows:

Class 1. MOLLUSCA, including the Cuttle-Fish, Nautilus and Snail.
Class 2. CONCHIFERA, including the Muscle, Oyster, Cockle, &c.
Class 3. TUNICATA, including several kinds of jelly-like animals enclosed in bags of skin.
Class 4. CIRRIPEDA, including several kinds of soft animals in shells, some of which attach themselves to the whale, and other sea animals.
Class 5. ANNELIDES, including the Earthworm, Leech, &c.
Class 6. CRUSTACEA, including the Lobster, Crab, Shrimp and Prawn.
Class 7. ARACHNIDES, including the Scorpion, Spider, Tarantula, &c.
Class 8. MYRIAPODA, including the Scolopendra and Gally-worm, &c.
Class 9. INSECTA, including the Louse, Flea, Beetles, Cockchaffers, Grasshoppers, Locusts, Crickets, Flies, Ants, Bees, Wasps, Butterflies, Moths, Silkworms, &c.
Class 10. ECHINODERMATA, including sea animals, as the Sea-Star, &c.
Class 11. ENTOZOA, including those worms that live in and upon other animals, as the Tapeworm, &c.
Class 12. ACALEPHA, including the Sea Anemone, &c.
Class 13. POLYPI, including the Corallines, Sponges, Madrepores, &c.
Class 14. INFUSORIA, including the myriad races of Animalcules, observed in infusions of different plants.

These Classes are again subdivided into Orders; those of the First Division, as follows:

CLASS I. MAMMALIA, INCLUDES TEN ORDERS, VIZ.

Order 1. BIMANA, two-handed, as Man.

Order 2. Quadrumana, four-handed, as Apes.

Order 3. Cheiroptera, as Bats.

Order 4. Feræ, as Moles, Bears, Otters, Weasels, Dogs, Wolves, Foxes, the Cat family, Seals and Walruses.

Order 5. Marsupialia, as Opossums, Kangaroos, &c.

Order 6. Glires, as Beavers, Lemmings, Rats, Jerboas, Marmots, Squirrels, Hares, &c.

Order 7. Edentata, as Sloths, Armadilloes, Ant-eaters, &c.

Order 8. Pachyderma, as Elephants, Hogs, Peccaries, Rhinoceroses, Horses, Asses, &c.

Order 9. Ruminantia, as Camels, Deer, Antelopes, Goats, Oxen, &c.

Order 10. Cetacea, as Dolphins, Porpoises, Whales, &c.

Class II. Aves, includes sixteen Orders:

Order 1. Rapaces, or Rapacious Birds, as Vultures, Falcons and Owls.

Order 2. Omnivoræ, or Omnivorous Birds, as Hornbills, Crows, Pies, Nutcrackers, Blackbirds, Rollers, Orioles, Starlings, and Birds of Paradise.

Order 3. Insectivoræ, or Insectivorous Birds, as Thrushes, Shrikes, Flycatchers and Warblers.

Order 4. Granivoræ, or Granivorous Birds, as Larks, the Titmouse, Buntings, Tanagers, Weavers, Crossbills, Grosbeaks and Finches.

Order 5. Zygodactyli, or Zygodactylous Birds, as the Honey-Guide, Cuckoos, Toucans, Parrots and Woodpeckers.

Order 6. Anisodactyli, as Nuthatches, Creepers, Humming-Birds and Hoopoes.

Order 7. Alcyones, as Bee-eaters and Kingfishers.

Order 8. Chelidones, as Swallows and Goat-suckers.

Order 9. Columbæ, as Pigeons.

Order 10. Gallinæ, as Peacocks, Domestic Fowls, Pheasants, Turkeys, Guinea-Hens, Grouse, Partridges and Quails.

Order 11. Alectorides, as Screamers.

Order 12. Cursores, as Ostriches, Rheas, Emeus and Bustards.

Order 13. Grallatores, as Plovers, Lapwings, Cranes, Herons, Storks, Flamingoes, Avosets, Spoonbills, the Ibis, Curlews, Sandpipers, Woodcocks, Snipes and Rails.

Order 14. Pinnatipedes, as Coots and Grebes.

Order 15. Palmipedes, as Skimmers, Terns, Gulls, Petrels, the Albatross, Geese, Swans, Ducks, Mergansers, Pelicans, Cormorants, Gannets, Tropic Birds, Divers, Puffins, Auks and Penguins.

Order 16. Inertes, as the Dodo.

Class III. Reptilia, includes four Orders:

Order 1. Chelonia, as Tortoises.

Order 2. Sauria, as Crocodiles, Alligators, Lizards, Iguanas and Chameleons.

Order 3. Ophidia, as Serpents.

Order 4. Batrachia, as Frogs, Toads and Salamanders.

CLASS IV. PISCES, INCLUDES NINE ORDERS:

Order 1. CYCLOSTOMI, as Lampreys.
Order 2. PLAGIOSTOMI, as Sharks, Torpedoes and Rays.
Order 3. STURIONES, as Sturgeons.
Order 4. PLECNOGNATHI, as Diodons, Tetraodons, File Fish and Trunk Fish.
Order 5. LOPHOBRANCHII, as Pipe Fish, Sea Horse and Pegasus.
Order 6. MALACOPTERYGII ABDOMINALES, as Salmon Trout, Smelt, Grayling, Herring, Shad, Pike, Anchovy, Flying Fish, Carp and Roach.
Order 7. MALACOPTERYGII SUBRACHIATI, as Cod, Haddock, Halibut, Turbot, Sole, and Lumpsucker.
Order 8. MALACOPTERYGII APODES, as Eels.
Order 9. ACANTHOPTERYGII, as Wolf Fish, Gilt-Head, Mullet, Perch, Mackerel, Tunny, Pilot Fish, Dorado and Sword Fish.

The fourteen Classes of the Second Division are divided into Orders, as follows:

CLASS I. MOLLUSCA, HAS FIVE ORDERS:

Order 1. HETEREPODA, including the Heterepodes, a gelatinous kind of sea animals.
Order 2. CEPHALOPODA, including the Nautilus, &c.
Order 3. TRACHELIPODA, including sea animals covered with beautiful shells.
Order 4. GASTEROPODA, including animals nearly naked, capable of locomotion.
Order 5. PTEROPODA, including small animals with thin shells, and furnished with fins for swimming: some of them form food for the whale.

CLASS II. CONCHIFERA, HAS TWO ORDERS:

Order 1. MONOMYAIRA, including animals with shells opening with a hinge, as the Oyster and Scallop.
Order 2. DIMYAIRA, including Cockles, &c.

CLASS III. TUNICATA, HAS TWO ORDERS:

Order 1. ASCIDIARIA, including certain animals fixed to rocks and enveloped in a tunic or bag.
Order 2. BOTRYLLARIA, including many small, soft and contractile animals.

CLASS IV. CIRRIPEDA, HAS TWO ORDERS:

Order 1. PEDUNCULATA, including certain soft animals with shells.
Order 2. SESSILIA, including animals enclosed in shells, and fixed on marine bodies, such as whales, tortoises, &c.

CLASS V. ANNELIDES, HAS THREE ORDERS:

Order 1. SEDENTARIÆ, including animals enclosed in tubes, without eyes or jaws, but having red blood in their veins.

Order 2. ANTENNATÆ, including animals furnished with eyes and jaws, as the Sea Mouse, or Aphrodite.

Order 3. APODES, including animals without feet and generally naked, as the Skate-sucker, Leech, Earthworm, &c.

CLASS VI. CRUSTACEA, HAS NINE ORDERS:

Order 1. DECAPODA, including animals enveloped in a shell, head not distinct from the body, feet two in number, as many species of Crab, Lobsters, Crawfish, Prawns, Shrimps, &c.

Order 2. STOMAPODA, including animals with a distinct head, in two parts.

Order 3. LÆMODIPODA, including animals without shells, with many feet, and heads not distinct.

Order 4. AMPHIPODA, including animals with heads bearing the anterior feet.

Order 5. ISOPODA, including animals with three jaws and many feet, capable of crawling on the land.

Order 6. LOPHYROPODA, including minute aquatic animals enclosed in shells, the head not distinct.

Order 7. PHYLLOPODA, including animals with sixty feet formed for swimming.

Order 8. XYPHOSURA, including animals with a body divided into two parts, covered with a divided shell.

Order 9. SIPHONOSTOMA, including animals covered with soft membranous shells.

CLASS VII. ARACHNIDES, HAS TWO ORDERS:

Order 1. PULMONARIÆ, including animals respiring through pulmonary sacs, some living in water and some on land, as Scorpions, Spiders and Tarantulas.

Order 2. TRACHEARIÆ, including animals with articulated bodies, and long jointed legs, terminated by hooks, as Mites, &c.

CLASS VIII. MYRIAPODA, HAS TWO ORDERS:

Order 1. CHILOGNATHA, including animals with crustaceous bodies; they have very short feet and walk slowly.

Order 2. CHILOPODA, including carnivorous animals, which run quickly, inflict wounds with their claws, and conceal themselves under stones, as the Scolopendra, &c.

CLASS IX. INSECTA, HAS ELEVEN ORDERS:

Order 1. THYSANOURA, including insects covered with scales or hair, living under the bark of trees, stones, or in houses.

Order 2. PARASITA, including insects living on other animals, with six feet and no wings, as Lice, &c.

Order 3. SYPHONAPTERA, including insects with a sucker in the mouth, as the Flea, the Chigger, &c.: the last species penetrates the skin under the nails and heels, and sometimes proves fatal by producing ulcers.

Order 4. COLEOPTERA, including insects with wings in cases; the body is in two parts; as the Glow-worm, Death-watch, Cockchaffer, Lady-bird, Beetle, &c.

Order 5. ORTHOPTERA, including insects with large wings covered with flexible wing-cases, as the Earwig, Walking Leaf, Cricket, Locust, Grasshopper, &c.

Order 6. HEMIPTERA, including insects capable of suction, with two wings, as the Bed-Bug, Aphides, Cochineal, and Great Lantern-Fly.

Order 7. NEUROPTERA, including insects with four transparent wings, and mouth proper for mastication, as the Dragon Fly, Ephemera, Termites, &c.

Order 8. HYMENOPTERA, including insects mostly with four wings, mouth furnished with jaws and lips, and tail generally armed with a sting, as the Gall Insect, Ants, Wasps, Hornets, Bees, &c.

Order 9. LEPIDOPTERA, including insects with four wings covered with farina, and a spiral trunk in the mouth, as the Moth, Butterfly, Sphinx, Silkworm Moth, &c.

Order 10. RHIPIPTERA, including insects with two naked wings.

Order 11. DIPTERA, including insects furnished with a proboscis terminated by two lips, as the Gnat, Midge, Tipula, Horse Fly, Common and Blue-bottle Flies.

CLASS X. ECHINODERMATA, IS NOT DIVIDED INTO ORDERS, BUT INTO THE FOLLOWING SECTIONS; THEY ARE ALL SEA ANIMALS.

Section 1. FISTULIDES, including animals with a soft, irritable and contractile skin.

Section 2. ECHINIDES, including animals covered with a shell, upon which are movable springs, which serve for locomotion.

Section 3. STELLERIDES, including animals divided into parts or arms, round a centre, as the Star Fish, or Sea Star.

Section 4. CRINOIDÆ includes animals with a strong stalk, spread out at the top and furnished with tubes.

CLASS XI. ENTOZOA, HAS TWO ORDERS:

Order 1. ELMINTHOGAMA, including soft animals attached to the body of fishes, and feeding upon them by means of sucking organs.

Order 2. ELMINTHAPROCTA, including soft animals feeding upon the internal parts of other animals. When numerous they produce serious diseases; as the Tape-worm, &c.

CLASS XII. ACALEPHA, IS DIVIDED INTO TWO SECTIONS, AS FOLLOWS:

Section 1. includes soft, gelatinous animals, fixed by their base, but capable of detaching themselves at will, as the Sea Anemone, &c.

Section 2. includes gelatinous animals, free and floating in the water, in the shape of a mushroom.

CLASS XIII. POLYPI, HAS FIVE ORDERS:

Order 1. POLYPI NATANTES, including compound animals, united in a fleshy body, free and floating in the water.

Order 2. Polypi Tubiferi, including gelatinous animals, united in a common body, fixed at its base.

Order 3. Polypi Vaginati, including animals grouped together on substances formed by themselves, as the Sponge, Corallina, Madrepores, Millepores, &c.

Order 4. Polypi Denudati, including animals with tentaculæ, sometimes fixed, and sometimes capable of motion, as the Hydra, or Polypi with arms. They live in fresh water.

Order 5. Polypi Ciliati are the lowest class of Polypi, very minute, and having mouths surrounded with cirri, or rotatory organs. They will retain their vitality for a long time, and will recover after having been dried for years, on being placed in water.

Class XIV. Infusoria, has two Orders:

Order 1. Infusoria Appendiculata includes minute, transparent, gelatinous animals, covered with hair and having horns and tails.

Order 2. Infusoria Nuda includes naked animalculæ, seen only with the microscope, as the Monad, the smallest of living beings, found in vegetable and animal infusions.

These orders, as I have before stated, are again divided into genera. Some orders have two or three genera, and others have a hundred or more; they are therefore too numerous to be mentioned here. I will however take one of these orders, and show you how it is divided into genera. Under the order Pachyderma, for instance, the several kinds of Elephants are one genus; the Hippopotamus constitutes a genus; the various breeds of Hogs are a genus; Peccaries are a genus; the several kinds of Rhinoceros are a genus; the Tapirs are a genus; and the Horse, Ass, Zebra and Quagga are a genus.

These several genera are divided, as before stated, into distinct species; thus of the Elephant genus there are two species, one inhabiting Asia and the other living in Africa; so of the Rhinoceros genus there are several species, some having one horn, and some two. The same may be said of the other genera.—I hope the reader may now understand the subject of classification. He will bear in mind that a species includes all the animals in the world of the same kind; thus all the horses in the world constitute a species; all the asses constitute a species, and so on. Those changes which are effected in a species of animals by climate and other circumstances are designated by the word variety; thus the several kinds of dogs are one species, but have become divided into different breeds, as the spaniel, mastiff, pointer, &c., each of which is called a variety of the dog.

ZOOLOGY:

OR, A

DICTIONARY OF ANIMALS.

ADDER: a name sometimes given to the viper.

ADJUTANT: this bird is of the heron tribe, and has a very singular appearance. The head is quite bare, having neither hair nor feathers, and terminated by a beak, which looks as if it were made of wood. The neck is also destitute of feathers, and under the chin is a bag, to receive the water which the bird drinks. It is common in India, and is seen on the tops of the houses and in the streets of Calcutta, almost as familiar as domestic fowls.

AGAMA: a small lizard, inhabiting South America and the West Indies. It lives in moist places, and never moves about till the evening. Its body is thick and covered with a loose skin, which can be swelled out at the will of the animal.

AGOUTI: this quadruped is a native of the warm parts of South America and the West Indies. It is about the size of a hare, and lives in holes in trees. It feeds greedily on all sorts of food, but principally on roots and fruits. Its hind legs are much longer than its fore paws, which it uses as the squirrel does, to carry its food to its mouth. It resembles a rat, but has a very short tail.

AI: see Sloth.

AKOUCHI: this quadruped resembles the agouti, except that it has a longer tail, and is smaller. It is of an olive color, and is common in almost all parts of S. America.

ALBATROSS: a bird somewhat larger than a swan, inhabiting the sea-shore in hot climates. It preys upon fish, and sometimes devours the smaller water-fowl. It makes its nest on lonely islands, usually in company with penguins. The sailors have many superstitions in regard to this bird. It is called the Wandering Albatross. There are three other species, which are all smaller.

ALEWIFE: a river fish resembling the shad and herring. Vast quantities are caught and salted for use.

ALLIGATOR: this creature, which is called Cayman by the South American Indians, is from ten to twenty feet in length. It lives in the warm parts of America in great numbers. Mr. Audobon, who has seen many of these animals, says that they are found in multitudes along the muddy shores of the Mississippi, in search of food, or stretched out in sleep. Their motion on land is slow and sluggish. They are very strong, and their great means of attack or defence is the tail. The monster, as it strikes with this, forces the object of his attack towards his extended jaws, and such is the strength of the blow, that it generally deprives his victim of life. When hunting his prey in the water, the alligator swims very slowly towards it, so as not to disturb the current. He approaches sideways, and when near enough, sweeps round his tremendous tail, and devours it in an instant. On the Red river, before it was navigated by steam vessels, these animals were so abundant, that you might see hundreds at a time on the rafts of floating timber, groaning and uttering a bellowing noise like thousands of irritated bulls, but perfectly careless of man, suffering boats and canoes to pass within a few yards of them without noticing them.

The alligator is clumsy upon the land, and is only dangerous in the water. It is of the lizard kind, and though closely resembling the crocodile of Africa and Asia, it is smaller and less ferocious. It is common in all the creeks, lagoons, and rivers around the gulf of Mexico, as well in North as in South America. The people of the south-western states borrow some forcible images from this animal. Thus, when they wish to describe a fierce and powerful man, they say he is half horse and half alligator.

AMEIVA: a species of lizard inhabiting Guiana and the Antilles. Very little is known of it, except that it is about a foot long, of a greenish color.

AMPHISBENA: this serpent is found in India and S. America. It is from one to two feet long, and is covered with smooth scales. It feeds on earthworms, beetles and ants, for which it digs into the earth.

ANACONDA: this serpent inhabits South America. He is twenty feet in length, of a bright brown color, with a double row of deep, brown, round spots along the back, and ocellated spots on the sides. In size, habits, and appearance it closely resembles the Boa, which see.

ANCHOVY: a small fish about six inches long, of which vast numbers are taken along the coasts of France and Italy. Near Leghorn, they are caught at night in nets, being attracted to the vessels by torch lights. These fish are eaten fresh, and are also used to make anchovy sauce. Being put over the fire in almost any liquor, they readily dissolve.

ANT: there are several different kinds of these insects, some red, some black, some with wings, and some without. They all possess a greater share of strength than any other insect of the same size. They are constantly laboring, and they often carry loads ten times their own weight. They are chiefly carnivorous insects, preying on the soft parts of animals, which they consume with wonderful rapidity. Ants of all kinds live in families.

They are very fond of their young, and nurse them with great care. When an ant-hill is disturbed, you may observe how anxious all the inhabitants are about a number of white substances, how they seize them in their mouths, to carry them to a place of safety. These are their young ones. The patience, perseverance, and courage of ants are surprising, and they are proverbial for their industry.

Let us not refuse to be taught by these little insects. In the Bible ants are spoken of as affording a most useful lesson. "Go to the ant, thou sluggard," says Solomon; "consider her ways, and be wise." The sight of one of these little creatures is said to have had a great effect upon the mind of a celebrated conqueror, named Timour. He was forced to take refuge from his enemies in a ruined building; as he sat alone there many hours, and was almost in despair, his attention was attracted by an ant, carrying something larger than itself up a high wall. He counted the efforts it made to effect its object, and found that sixty-nine times its burden fell to the ground, but the seventieth time it reached the top. "This sight," said Timour, "gave me courage at the moment, and I have never forgotten the lesson it conveyed." Let my young readers gain the same improvement from it, and when they have any thing to do which is difficult or troublesome, let them go on patiently trying and generally, like the little ant, they will succeed at last.

There is one most extraordinary circumstance respecting some ants, which I must now tell you. You will smile at the idea of their having cows, yet it is quite true that they keep certain insects, from which they draw a sweet liquid, in the same manner as we obtain milk from cows; and they even make a property of them. If any stranger ants attempt to climb the branch of a tree, or the stalk of a plant, where they keep their herds, those who consider themselves the rightful owners drive them away, and may be seen running about in a great bustle. Sometimes they build a little wall round the place where these cattle are, and so keep them safe in a kind of pen. Some kinds, choosing to have them still more within reach, carry large herds of these insect-cows to their nest, and let them feed on the grass and stalks round which it is built. They take as much care of these creatures' eggs as of their own, put them in a place of safety when the nest is attacked, and carry them in the same manner into the sun; that by their being hatched early, there may be a good supply of their nourishing food.

Ants are remarkable for courage. Though so small, they never fear to face any danger, but immediately turn round and prepare to bite, and to shoot their poison into the wound. They sometimes fix themselves so obstinately to the object of their attack, that they will sooner be torn limb from limb than let go their hold; and man himself strikes no terror into them.

These tiny nations, so well armed and courageous, are not always at peace with their neighbors. A square foot of earth is to them a kingdom; their droves of insect-cattle are as valuable to them as our flocks and herds are to us; and the body of a fly, or a beetle, is a most valuable possession. No wonder then if wars and quarrels arise. Myriads may sometimes be seen pouring forth from two rival cities, and meeting half way between their respective habitations, equalling in numbers the armies of two mighty empires. Though they do not cover a space larger than two or three square feet, yet they present a spectacle exactly like that of a field of battle where men are the combatants. Thousands are to be seen struggling together, shooting poison at one another, which fills the air with a strong odor, and is as destructive to them as gunpowder is to us. Thousands of the dead and mangled strew the ground, while others are led away as prisoners; and crowds are seen hastening to reinforce the contending armies.

How the ants know those of their own party, it is impossible to say, as they are generally of the same kind, and appear to us to be all alike in make, color, and scent. They are not distinguished, as human soldiers are, by different colored uniforms, yet it very rarely happens that two of one side attack each other; and if, by chance, they do, the mistake is presently found out, and they make friends directly. When night comes on, each party returns to its own city, but the next morning the battle is resumed with fresh fury, until at length a rainy season separates them, and the quarrel is forgotten.

Ants not only fight pitched battles, as we have seen above, but they also besiege neighboring cities, and take them by storm. The object they have in view is a most extraordinary one, and could hardly have been believed, if it had not been observed, and related, by so many people. The ants we are now going to speak of are warlike and powerful, but not industrious like most other kinds. In order that they may have slaves to do their work for them, they attack the nest of a dark colored kind, called negro ants, and carry off their young. To these, when they are grown up, all the labor is left; they build and repair the common dwelling, collect food, attend to the young, and even feed their masters, and carry them about the nest. Every year, the light colored ants add to the number of their slaves. At the season when there is a proper supply of workers in the negro ant-hills, they send out spies into the neighborhood, and prepare for marching. On the return of these spies the signal is made, by touching one another with their antennæ, and they then set out to attack the negro city. Their way of marching is singular; eight or ten ants march first, and these continually wheel round and join the rest of the army, while others succeed to their station.

As soon as the guards of the city perceive the enemy coming, they dart upon them with the utmost fury, and crowds pour forth to assist; but the besieging party rush on, and drive them back, until they retreat into the lowest story. Numbers enter with them at the gates; while others make a breach in the walls, through which the conquerors march in. Presently they all come out, each carrying a young ant, which has been seized in spite of its anxious guardians; and thus they return in triumph with their spoil. It is a curious sight to behold their slaves, coming out of the nest to meet them, conducting the young prisoners in, bringing food to the warriors, and caressing them, as if they rejoiced at their return. These on their parts are much attached to their faithful servants, and when the nest is attacked by other ants their first care is to carry them into a place of safety. Having been taken when they were quite young, they do not feel the change, and are quite as happy as they would have been among their own nation, where they would have had the same tasks to perform.

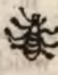
In Africa and the Indies there is a species of ants called the White Ants or Termites. These insects are a quarter of an inch high, and devour every thing they can get at, but wood is their favorite food. They will sometimes destroy all the wood work in a room in one night. Their habitations are very wonderful, being sometimes twenty feet high, made of clay, and resembling sugar loaves. They are so hard, that you may walk upon them without any danger of breaking them. There is a kind of ant in South America, which form their nests of green leaves. While they are collecting them, each brings a piece of leaf large enough to hide it entirely; from this circumstance they are called Parasol Ants.

ANTELOPE: this genus embraces many species, as the Common or Indian Antelope, Striped Antelope, Springbok, Gemsbok,

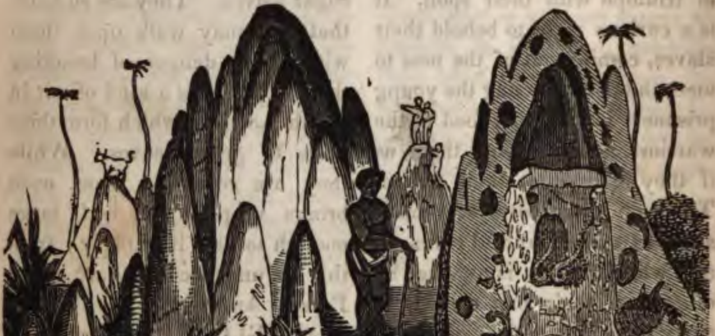
The manner in which some Termites build their Nests.

Ant King.

Soldier.



Laborer.



Nests of Termites. *Inside of Nests.*

Elk Antelope, Scythian Antelope, Hartbeest, Prong-horned Antelope, Harnessed Antelope, Blue Antelope, Chamois, and some others. The Gnu has been considered as belonging to this race, though perhaps improperly. They are all natives of the Eastern continent, except the Prong-horned, which inhabits the United States; they are distinguished by large lustrous eyes, pointed ears, and slender legs. They are generally extremely timid and fleet.

The Common Antelope is a little smaller than our common deer. When young they are of a yellowish fawn color, and grow darker with age. They inhabit the whole of India, roaming in wild herds of fifty or sixty over the uninhabited plains. The Hindoo princes pursue this animal with trained hawks, which fix their talons upon the head and throat, and keep it till the dogs come up. The Striped Antelope is as large as a stag, and has white stripes extending along the back and sides. It inhabits the Cape of Good Hope. The Elk Antelope has straight horns two feet in length. It inhabits India, Congo, and the southern parts of Africa. The Scythian Antelope inhabits the deserts in the northern parts of Europe and Asia. The Prong-horned Antelope is a peaceful animal, inhabiting the plains about the Rocky mountains. The Harnessed Antelope is of a brown color, most singularly marked with white bands upon the back and sides, resembling a harness. It is found in Senegal, in Africa. The Blue Antelope is of a silvery blue color, and is found in the southern parts of Africa.

ANT-EATER: there are three species of this animal in S. America, all resembling each other, but differing in size. The Tamanoir, or Great Ant-Eater, is about four feet long, with a tail two feet and a half long. The tongue, which is two feet long, is doubled in the mouth, which he never opens, but out of which he puts his tongue through a small hole. His snout is very long, and his feet are furnished with strong claws. His hair is long, and of a black and white color. He lives in the deepest forests, and feeds upon ants, by running his long slimy tongue into their nests. He is very inoffensive, and never attacks any animal, but if molested, he seizes the oppressor with his powerful paws, and hugs him to death.

ANT-LION: this insect lives in warm climates, and is about half an inch long. He has a very curious method of gaining his subsistence. He digs a hole in the sand, which when finished is three inches wide at the top, and two inches deep, descending gradually to a point. The ants upon which he feeds, on approaching the edge, slide down the slope into the jaws of the ant-lion, who waits to devour them. If able to stop before they reach the bottom, the ant-lion throws sand upon them till they can resist no longer, and fall into the pit, where they are speedily devoured.

APE: this name is applied in its most general sense to the whole monkey tribe, including perhaps a hundred species. They have all a general resemblance to man. They inhabit tropical regions in both continents. Those belonging to America pass under the general name of Sapajous, and all have long tails. It is a curious fact that they have one grinding tooth more in each jaw than the apes of the old continent. In a more restricted sense, the word ape is given to those monkeys which have the closest resemblance to man. These are capable of similar exertions, can walk upright, are destitute of tails, and have a sort of thin calf to the leg. They are distinct from the baboons, which have a short tail; and are still more unlike the proper monkeys, these having long tails, and bearing more resemblance to quadrupeds. The most remarkable species of apes are the Ourang Outang, the Pongo, the Chimpansé, the Gibbon, the Siamang, and Magot. The apes are very imitative, but do not possess as much sagacity as the elephant or dog. They are adapted to climbing trees, and are generally found in forests. Their gait on the ground is generally on all fours, and is awkward and by leaps. Their resemblance to man sometimes makes their actions appear quite ludicrous.

ARGALI: this quadruped is a species of sheep, about the size of the fallow deer. There are two species, the Asiatic Argali, inhabiting the alpine parts of Asia, and the Corsican Argali. This last species is of a darker color, and extremely wild. These animals have immense horns, arched backwards: their color is a ferruginous brown above and whitish beneath. They frequent the highest mountains, where there are no woods. They are very timid, and when closely pursued, which they often are for their flesh and skin, they turn and double like a hare. They feed upon grass, young shoots and vegetables.

ARGENTINE: a small sea-fish, two or three inches in length, and of a dusky green color.

ARMADILLO: of this quadruped there are many species, all resembling each other, but differing in size and in the construction of their shell. This armor which covers the head, tail, and all the upper parts, is not one solid piece, but it consists of several parts, joined to each other by membranes. The armadilloes are found chiefly in South America. They are harmless and innocent, burrowing in sand hills like a rabbit. They feed upon vegetables, fruits, and roots. They walk rapidly, but they can neither climb trees nor run; so that when pursued, their only resource is to dig into the ground, which they do with great rapidity. In order to get them out of the burrow the hunters smoke them, though this plan is not always successful, as while their enemy digs the animal digs also, and throws up the dirt so as to exclude the smoke. The armadillo is sometimes hunted by small dogs and overtaken; he then rolls himself into a ball, and is carried away. Sometimes, if he finds himself near a precipice, he rolls himself up, and falls down unhurt, and thus escapes his pursuers.

ARNEE: this quadruped is a species of ox. It is very large, and is from six to seven feet in height. The horns are two feet long. It is found in various parts of India, and is seldom seen near settlements, but lives in remote woods and wilds. Some of the Indian princes are said to keep arnees for parade, under the name of fighting bullocks.

ASP: this serpent is about three feet long, of a gray color, spotted with black. It is common in Egypt, and is very poisonous. It feeds on rats, mice, lizards, frogs, and toads.

ASS: although this quadruped resembles the horse, he is of a distinct species, and is in many respects dissimilar. The head is larger, the ears longer, and the tail destitute of hair, except at the end. The voice is loud and discordant. Wild asses are found in great herds in Mexico and South America, but they are the offspring of the domestic ass, introduced by the Spanish settlers. In India, Tartary, and Persia, they have lived in a wild state from the earliest ages. Their color is nearly the same as that of the domestic ass, with a brown stripe along the back, and two across the shoulders. Their food is generally the saltest plants of the desert, and they prefer salt water to fresh. Their senses of hearing and smelling are so exquisite that it is difficult to approach them. They live in herds, and are exceedingly timid. Their flesh is considered delicious eating by the Tartars, and of their skins that kind of leather is made, which is called shagreen. The Quagga of Africa has frequently been confounded with the ass, but it is now known to be a distinct species. The domestic ass is humble, patient, and quiet, contented with the scantiest herbage, but not satisfied without the clearest water. He is capable of great affection, and knows his master from all other men. He will carry heavy burdens, and is of great use in many countries both for draught and for the saddle. His pace is very gentle and easy, and he is very surefooted. His milk is good for sickness, and his skin is used for various purposes. The ass is little used in the northern parts of the United States; in the middle and southern states they are common, and in the West Indies, Mexico, and South America they are the chief beasts of burden. In many parts of Europe they are much used.

ATHERINE: a fish common in the sea near Southampton, in England. It is about four inches long, and is there called a smelt. It never deserts the place, and is taken in considerable numbers at all times, except in cases of hard frost.

AUK: this bird, of the penguin kind, is of the size of a goose; its plumage is black above and white beneath. It is common on the coasts of Norway, Greenland, and Newfoundland. It is very timid, and has not the power of flying. It feeds upon fish. It is generally called the Great Auk. The Little Auk also inhabits Europe and America, and is nine inches in length.

AVOSET: this bird is of the crane kind. There are two species, the Scooping Avoset, and the American Avoset, called by the inhabitants of Cape May, the Lawyer. The peculiarity of these birds is the shape of their bill, which turns up like a hook, and is three inches and a half in length. Their legs are long, and they are web-footed. The Scooping Avoset is found in winter on the sea-coast of England, but is generally found in Italy. The American Avoset frequents the salt marshes of New Jersey, and builds its nest of sea-weeds, dry grass and twigs, several inches high. These birds live on worms and insects, which they scoop out of the earth with their bill.

AXIS DEER: see Deer.

B.

BABYROUSSA, or Indian Hog: this, as its name imports, is a species of hog, although it differs from that animal in many respects. Its legs are longer and its muzzle shorter. It is found in different parts of Africa and Asia; it is covered with soft, short hair like wool, its body is not so thick or clumsy as that of the hog, its ears are short and pointed. Its skin is black, and it has four enormous tusks, the two shortest coming out of the lower jaw; the two others, which come from the upper jaw, rise crooked to the eyes, giving these animals a very formidable appearance: they are, however, less dangerous than the wild boar; for although fierce and terrible when offended, they are harmless when unmolested. They live chiefly upon vegetables and leaves, although they are probably carnivorous. When closely hunted, they plunge into the sea, where they swim with great swiftness.

BABOON: the general name given to several species of animals, resembling both man and quadruped. They are distinguished from the true apes by a short tail, long snout, and a fierce, petulant temper. The largest of the baboon kind is the Mandrill; the other principal ones are the Dog-faced and the Pig-faced Baboons. These animals generally go on all fours, have thick bodies and limbs, and are covered with reddish brown hair.

BADGER: a quadruped, of which there are two species, the European and the American, bearing a close resemblance to each other, the latter being however the smallest. Its legs are short and strong; it burrows in the ground very easily, and seems to avoid the light, as it leaves its hole only in the night to procure subsistence. It lives principally on fruits, roots, snails, and worms. It also devours small animals. Its hair is so long as to touch the ground. In South America, the hunting of this animal is a favorite sport with the natives.

BALD EAGLE: see Eagle.

BALTIMORE ORIOLE: see Oriole.

BARBEL: this is a European fish, and grows sometimes to the weight of eighteen pounds. It lives in the deep parts of rivers, and roots with its nose in the soft banks. Its flesh is coarse, and seldom eaten except by the poor.

BARNACLE: see Goose.

BASILISK: the name of a fabulous serpent, imagined by the ancients to have the power of striking dead those objects it looked upon. It is now applied to a harmless lizard of S. America. This creature is sometimes three feet in length, including the tail, and has a ridge resembling the fins of a fish running along the back, from the head to the end of the tail. It has also a sort of cap upon the head, which has given it the name of the mitred basilisk. This ridge and cap assist the animal in jumping from tree to tree, by being inflated with air. It lives generally among trees, but is not confined to them, as it can swim very well, and is sometimes found in the neighborhood of water.

BASSE: this is a kind of sea-perch, very abundant on the European coasts, particularly in the Mediterranean and on the coast of Holland, where it is greatly esteemed as an article of food. It is also common along the American coast, and is caught in great quantities near the mouths of our large rivers. The Rock and White Basse of lake Erie appear to be the same as the sea basse.

BAT: a very curious kind of animal, of which there are many species, partaking of some qualities both of the bird and quadruped, yet belonging to neither class. The fore feet are a kind of winged paws, or hands, ten times larger than the feet, and generally four times longer than the whole body of the animal. To these are attached membranes, which, when expanded, form large wings, which enable the creature to fly with great ease. Averse to the society of all other creatures, Bats shun the light; and when at evening they have made their meal upon moths and insects, they return to their hiding places in clefts of rocks and the recesses of caverns. The most remarkable species of bats are the New York Bat, which is common among us; the Long-eared, Horse-shoe, and Rhinoceros Bats of Europe; the Rousette or Vampire Bat of Madagascar, and the Spectre Bat of South America. The Vampire Bat is four feet in length from the tip of one wing to that of the other. It is sometimes called the Fox Bat, from the redness of its color, and the resemblance of the head to that animal. These Bats are so numerous along the coast of Malabar as to darken the air. At night, they make such a noise as to be heard at the distance of two miles. They devour the fruits, and often destroy fowls and domestic animals. They sometimes settle upon man, attacking the face and inflicting serious wounds. The Vampire, or Spectre Bat of South America, sucks the blood of animals and men at night, sometimes fatally. It is done in a manner so gentle as often not to be known, till the sufferer finds himself exhausted.

BEAGLE: this is the smallest kind of dog that is used for hunting in England. It is remarkable for the melody of its tone and the keenness of its scent.

BEAR: of this animal there are nine species; the Brown Bear, Black Bear, Polar Bear, Grizzly Bear, Barren-ground Bear, Large-lipped Bear, Bornean Bear, Thibet Bear, and Malayan Bear. The Brown Bear is about four feet long, and is, as his name imports, of a dark brown color. He is found in Europe and Asia, and is particularly numerous in Kamschatka. He is a savage and solitary animal, living in gloomy forests, where he spends the winter in a hollow tree or in some cavern. These animals are capable of instruction, and are frequently tamed, and taught to dance to an instrument. The Black Bear resembles the Brown Bear in size and form, but is of a shining

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A WHITE BEAR, FEEDING ON A WHALE, AMID THE ICE.

THE BROWN BEAR, KILLING A DEER.

black color. He is found in the northern parts of America, in solitary forests. Here he subsists upon fruits, roots, honey and fish. He will also attack small animals, when other resources fail him. The Indians hunt this bear for his fur, which is of some value. The White or Polar Bear is sometimes twelve feet long. It is distinguished by its tremendous ferocity. In the polar seas immense numbers of them may be seen on the ice, where they sometimes float out many miles to sea. Here they feed upon fish, seals, and the carcasses of whales. On land their food consists of animals and berries. They are capable of great attachment to their mates and young, and a she bear will very often expose herself to wounds and death for her young ones. It is found on both continents. The Grizzly Bear is twice the size of the Black Bear. Its color is grayish brown, and the hairs are all tipped with gray. The feet are enormously large and strong. The principal resort of this animal is in the Rocky mountains, though he may be found in most of the northern parts of North America. He is the most formidable of all bears, and reigns the monarch of the woods. His extreme tenacity of life renders him very dangerous. He will sometimes receive eight balls in his body, and still continue his attack. The hunters on the Rocky mountains meet with many perilous adventures with the Grizzly Bear. The Barren-ground Bear resembles the Brown Bear in size and form. Its general color is a yellowish brown. It frequents the barren lands around Great Slave lake and extending to the Arctic sea. It feeds upon fish. The Indians hold this animal in great dread. The Large-lipped Bear is a curious creature, covered with black shaggy hair, which on the back is a foot long. Its lips are thin and long, and the animal has the power of protruding them to a great length. It is a native of India, and feeds on fruits, nuts, honey, and fat, but refuses flesh and roots. It is harmless, gentle, and sluggish in its movements. It is said to burrow in the ground. The Bornean Bear is distinguished from other bears in the shape of the head, and by having a tongue nearly a foot in length. Its fur is short, soft and jet black; its length about three feet nine inches. It is a native of Borneo. It is very voracious, and one of them died in London some time since from eating too much. Its principal food was bread. The Thibet Bear is of a black color, and has a very flat head and thick neck. Its limbs are heavy and its ears very large. It lives on fruits and is not carnivorous. Of the Malayan Bear but little is known.

BEAVER: this singular animal differs very much from other quadrupeds in its conformation and habits. It is about two feet long and one foot high, and has a broad flat tail covered with scales, which serves as a rudder in the water, and, some writers have supposed, as a trowel in the building of its house. Its hind feet only are webbed, and its fore feet it uses like a squirrel. It is usually of a light brown color, though varieties have been found in the northern parts of America; some black, some white, and some spotted. Its teeth are long and sharp, for the purpose of cutting the trees for habitations and food. The houses of the Beaver are built on the bank of a pond or river, of sticks, mud, and stones, plastered with clay on the outside, when the cold weather commences. If they are placed on a running stream, the Beavers construct a dam of the same materials that they use for their dwelling, to break the force of the water. Much of their timber is cut down by their teeth, above, and floated down the stream.

One dwelling generally contains ten beavers, who work during the summer and regale themselves upon the choicest fruits and plants. In the winter season they feed upon wood; in summer, upon bark and fish. The Beaver is hunted for its skin, which is a great article of traffic. It also furnishes the oil called castor. The ingenuity of this animal excites the admiration of all who observe its habits. It seems to possess a knowledge far surpassing that of most other quadrupeds.

BEE: an insect, of which there are several kinds; the most interesting species is the Honey Bee. Small and insignificant as this little creature might appear to be, it is one of the most wonderful animals in the world. Many of them live in a wild state and make their hives in hollow trees. In America, and other countries, there are persons who devote themselves to finding these hives for the sake of the honey. One of the most common methods adopted is to place some bee-bread, in order to tempt the bees, on a flat board or tile, and draw a circle round it with white paint. The bee always settles upon the edge of any thing flat, so she must travel through the paint to reach the bee-bread. When she flies away, the white on her body enables the observer to trace her flight, and her course is marked down with a pocket compass. The same thing is done at another spot, some distance from the first, and by comparing the direction of the two lines, the situation of the nest is easily found, as it must be at the point, where, if continued, the lines would meet. In Africa, the bee hunter is aided by a little bird called the Honey-Guide. In the same country the Honey Ratel will sit and hold one of his paws before his eyes, about the time of sunset, in order to get a distinct view of the objects of his pursuit; and when he sees any bees flying, he knows that at that hour they are returning home, and so he follows them.

The domestic bees afford a good opportunity for studying the habits of this wonderful race of insects. Three kinds of bees are discovered in the hive; the drone, the queen-bee, and working bee. The drones are the fathers of the young bees, and live an idle life. They are larger than the rest, and make a louder hum in flying. The queen is the mother of the young bees, and governs the hive. The subjects are much attached to her.

If she dies, the whole community is thrown into the greatest agitation, and those which first find out what is the matter, run about the hive in a furious manner, touching every companion they meet with their little horns or feelers, which are called antennæ. These in their turn run about in the same manner, and inform others of the sad event, till the whole hive is in confusion. This agitation lasts four or five hours, after which the bees begin to take measures for repairing their loss. Nothing can be more extraordinary than the way in which they proceed. They build several cells, which are much larger than the common ones, and of a different form. Having removed one of the worker worms into each of these, they feed it with a particular kind of food, and in a few days it grows larger, and at length comes out a queen. One of these becomes the sovereign of the hive.

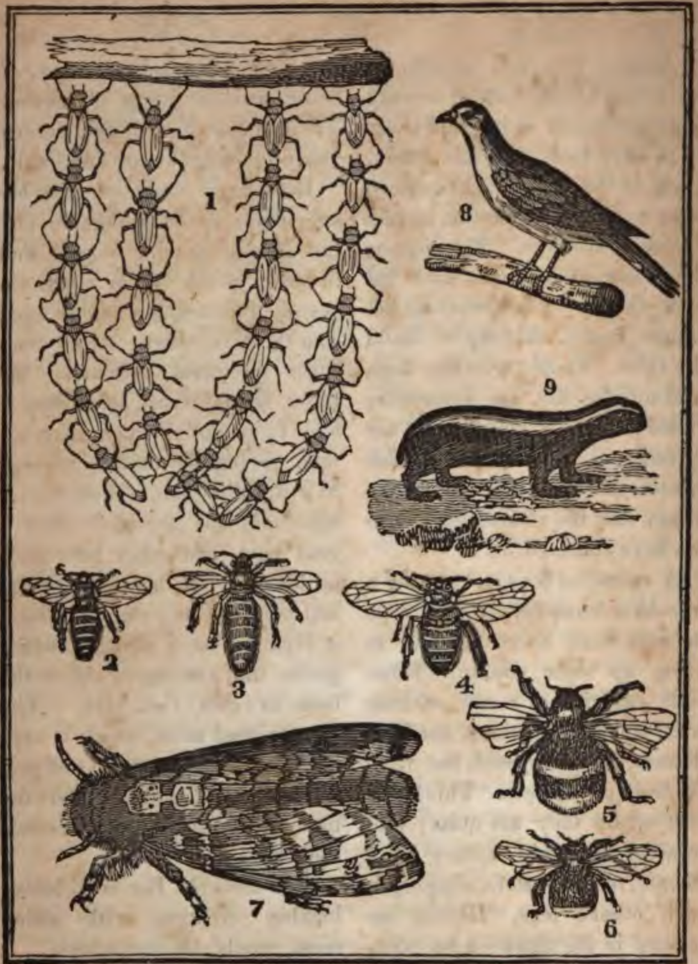
If the bees lose their queen, and there are no worms or young to supply her place, they leave off working, and die in a few days. But if in the midst of their agitation their lost queen should be restored, they are quiet immediately, for they instantly remember and distinguish her from all others. If a new queen were to be placed in the hive too soon after the loss of the other, no attention would be paid her, and she would be starved, or smothered in the crowd. But when four and twenty hours have passed, and the first grief is over, a stranger queen is well received and reigns immediately. The bees crowd about her, touch her by turns with their antennæ, give her honey, range themselves round her in a circle, and follow her as a guard when she moves.

The offspring of one queen alone is too numerous for a hive to hold. She will sometimes lay in one season sixty or seventy thousand eggs; so it would never do to have more than one queen. Some of the eggs turn to queens, some to drones, and the largest portion to workers. The swarms that leave the hive are each led by a queen. The drones do not collect honey, or help to build the cells. People, who like them lead an idle life, are sometimes called drones. The drones are turned out of the hive before winter, that they may not eat the honey that the industrious workers have collected.

A swarm of bees on entering a new hive immediately want cells to store their honey in, and to bring up their young. These cells cannot be made without wax, which is obtained, not from flowers, as is supposed, but from the body of the bees. This forms best while they are quiet; and in order to obtain it, they hang themselves in clusters, clinging to each other's legs. Having remained in this situation for twenty-four hours, they scrape it off, and form it into cells, the tongue being used as a sort of trowel. Their industry, skill and contrivance in doing this are admirable.

Bees have many enemies beside man, the Honey-guide and the Honey Ratel. Wasps and hornets attack them while in search of flowers, and moths steal into the hive, where they sometimes do great mischief. At night, sentinels are set to watch, and by moonlight you may see them pacing to and fro, turning in every direction. If an enemy approach, the sentinels utter a loud hum, and other bees rush to their aid. If the moth gets in, and escapes being stung to death, it lays its eggs, which produce grubs, that sometimes oblige the bees to quit the hive. The Deaths-head moth, which is very large, sometimes gets in and produces a sound, which renders the bees motionless, and then it steals their honey.

The Humble Bee is a clumsy looking creature, with which most people are acquainted. It builds its nest in hay fields, of



1. *Bees making wax.*
2. *Working Bee.*
3. *Queen Bee.*
4. *Drone.*
5. *Humble Bee.*
6. *Mason Bee.*
7. *Death's Head Moth.*
8. *Honey Guide.*
9. *Honey Ratel.*

moss. The way in which the bees collect this material is curious. One bee settles on a tuft of moss with its head turned from the place where the nest is to be. It then tears off little bits with its teeth and fore legs, and passes them to the middle pair, and then to its hind legs, when it holds out the bunch of moss as far as it can, to another bee who is placed behind. This bee receives it, and in the same way passes it to the next, and so on till it reaches the nest. This is lined with coarse wax, and contains a few combs, clumsily made.

The Humble Bee is tormented by a kind of mite, which sometimes is found upon them in great numbers. They have recourse to a most amusing contrivance to get rid of them. A Humble Bee thus tormented will go to an ant-hill, and then kick and scratch till the ants come out to see what is the matter. Before they drive their noisy visiter away, the ants sieze upon these mites and carry them off as a prize, and the bee, as soon as it is set free from its enemies, flies away contented.

There are several kinds of bees which live alone and form a nest by solitary labor. One of the most interesting of these is the Mason Bee, which builds her nest in the hole of an old wall, of little pieces of clay. She makes four or five cells, about the size of a thimble, and in each of these she lays an egg. The Carpenter Bee makes her nest in an old post, by boring a hole twelve inches deep, and larger than your finger. This is accomplished by means of two strong teeth. She then deposits her eggs, and separates each one by saw-dust and a gummy fluid from her mouth. She then closes the entrance to the nest to keep out any intruders. The Upholsterer Bees are so called, because they line their nests with hangings of leaves and flowers. One of these, called the Leaf-cutter Bee, makes a hole in the ground, and lines her cells with green leaves. Another bee chooses the bright scarlet leaves of the poppy to hang around her nest, which she digs out of old wood in the form of a pear. Here she lays her eggs, and then covers the whole of her work with earth.

BEE-EATER: of this bird there are about twenty species, in the warmer parts of Europe, Asia, and Africa. The Common Bee-eater feeds upon bees and wasps, which it takes on the wing, like the rest of the genus. On the Mediterranean it is taken by fastening a bee upon a hook, tied to the end of a fine thread. The bird seizes the bee, and is thus captured. The Indian Bee-eater is about the size of a blackbird, and feeds upon bees, grasshoppers and other insects.

BEEF-EATER: this bird is about eight inches long, of a light brown color above, and a dirty yellow beneath. It has a strong thick bill, with which it picks worms and insects from the backs of oxen. It is a native of Senegal.

BEETLE: of this insect there are various kinds, all having cases to their wings, to prevent them from rubbing or crushing themselves in the earth, in which they form their abodes. They differ in color and size, but in other respects resemble one another. Some live wholly on the land, while others live as well in the water. The principal beetles are the Great Stag Beetle, Diamond Beetle, Burying Beetle, and Elephant Beetle. The Great Stag Beetle is three inches in length, and is of a dark brown color. It derives its name from the jaws, which resemble the horns of a stag. It flies only in the evening, in search of food. The Diamond Beetle is most beautifully colored with green and gold, upon a black ground. It is found in South America. One species in India is so very brilliant, that the wing-cases are set like gems in rings and brooches. It is of a beautiful green color, with gold bands. The Burying Beetle is a most singular insect, of a black color. It derives its name from its habit of burying the dead bodies of animals for the nourishment of its young. The strength which these insects display in accomplishing this work is astonishing. They hollow the earth from under the body, and then push it into the cavity and cover it up. Two beetles will bury a frog in twelve hours. The Elephant Beetle is so called from a proboscis which terminates his head, being both an inch and a quarter long. It is the largest beetle known. It is black, and covered with a hard shell, as thick as that of a crab. It is found in South America.

BIPED: an animal with two feet, as man.

BIRDS: the structure of birds is in most respects entirely dissimilar both from that of man or of quadrupeds. One obvious distinction between this class of animals and quadrupeds is, that instead of hair, birds are covered with feathers; and these appear to be nourished and kept in order in a different manner from the hair of animals. Lest the feathers should spoil by exposure to the air, the bird is furnished with a gland, containing a proper quantity of oil, which it presses out with its beak, and with which it occasionally anoints its feathers. In water-fowl, this oil is so plentiful, that it even imparts a degree of rancidity to the flesh, and we see that their coat of feathers is rendered by it completely water-proof.

The wings of birds are remarkably strong. The flap of a swan's wing would break a man's leg; and a similar blow from an eagle has been known to lay a man dead in an instant.

The sense of seeing in birds is remarkably acute; and though they have no external ears, but only two small orifices, or ear-holes, yet they do not seem to be deficient in hearing. The scent of some species is exquisitely delicate. In decoys, where ducks are caught, the men who attend them generally keep a piece of turf lighted, on which they breathe, lest the fowl should smell them, and fly away. The voices of birds are much louder in proportion to their size than those of other animals.

The legs, the wings, the bones, and every part of the body are much lighter, firmer and more compact in birds, than in other creatures. Their lungs are extended all over the cavity of their bodies.

Birds of the same species do not always make their nests of the same materials; though in general there is a uniformity. The Redbreast in some parts of England makes his nest of oak leaves, where these leaves are plentiful; in other parts it makes it of moss or hair. Where the eggs are numerous, it is necessary to make the nest warm: thus the Wren, which is a small animal, and able to cover but a small compass, and yet lays many eggs, makes her nest very warm; on the contrary, the Plover, the Eagle, the Crow, &c., which lay but two or three eggs, are not so careful in this respect. The Ostrich deposits its eggs in a hole rudely formed in the sand. The Sociable Weavers of the Cape of Good Hope, instead of building their nests singly, combine for security against serpents and monkeys, and build connected nests upon smooth-barked trees, in the form of an umbrella. The nests of a species of Swallow common in China, are composed of a glutinous substance resembling isinglass. The Chinese epicure will pay a high price for them, considering them delicious ingredients in soup. As these birds build in deep caverns on the sea-shore, great dangers are encountered by the men who procure the nests. The Long-tailed Titmouse forms a nest in the shape of an egg, with a small hole at the top, which is covered with a slanting feather, to carry off the rain. This nest is always covered with moss, the exact color of the tree. The Reed Warbler suspends his nest upon reeds, about a foot from the water.

There are some birds which are called birds of passage, and which, by migrating, make a habitation in all parts of the earth; but in general, every cli-

Nests of the Sociable Weavers.

Long-tailed Tit Mouse.

Reed Warbler.

mate has birds peculiar to itself. Nothing is more curious than these migrations, which seem to be the consequence of climate, fear or hunger. In this country, they take place in spring and autumn. Those which arrive in spring, and come from warmer climates, leave us in autumn; others, from the arctic regions, arrive in autumn and depart in the spring. One of the most curious particulars connected with these annual migrations, is the circumstance of individuals returning for a series of years to the same nestling places. A lame Starling has been observed to occupy the same nest in the hole of a tree for eight years.

Birds in general live long. Swans are said to live a hundred years. Carnivorous birds, particularly the Eagle, live to a very great age, and Ravens live upwards of a century. Parrots have been known to live sixty or eighty years. Birds fly with great rapidity; the Wild Pigeon will fly three or four hundred miles in six hours.

The number of species of this class of animals is very numerous, amounting to above eight hundred.

BIRD OF PARADISE: of this bird there are several kinds; the Great Bird of Paradise, the Royal Bird of Paradise, the Golden-breasted Bird of Paradise, and some others. They inhabit some of the Asiatic islands and New Guinea. They are seen in flocks of thirty or forty, and mariners generally observing them in the air, have therefore given them the fanciful name of Birds of Paradise. Their plumage is very beautiful, and greatly esteemed for dress. The Great Bird of Paradise, from the abundance of its feathers, appears to be as large as a pigeon, but its body is not larger than that of a robin. The other species are smaller.

BISON: this animal is peculiar to North America, and roams in vast herds over the western prairies. It is not now found east of the Mississippi, though it probably inhabited, in former times,

BISONS CROSSING A RIVER IN WINTER.

the whole country to the shores of the Atlantic. It bears considerable resemblance to the German Aurochs. It is as large as an ox, with a prodigious hump over the shoulders. The head, shoulders, and upper parts are covered with long, brownish, woolly hair. The tail is tufted with black.

These animals, while feeding, scatter themselves over the country, but when moving in a mass, they form a dense column, which, once in motion, is scarcely to be impeded. Their line of march is seldom interrupted even by considerable rivers, across which they swim without fear or hesitation in the order in which they traverse the plains. They constantly wander about, either from being disturbed by hunters, or in search of food. They are very fond of the soft and tender grass which springs up after a fire has spread over the prairie. In winter they scrape away the snow to reach the grass. They are timid, and fly from man, but when wounded, they become desperate and dangerous. The Indians make incessant war upon them for their flesh and skins. Their favorite method of attack is to ride up to the fattest of the herd on horseback and shoot them. Sometimes they drive them over precipices, by which they are killed. They also take them in inclosures made of sticks, about a hundred yards in diameter. The herds are attended by packs of wolves, ready to fall upon the sick and wounded. Travellers describe the noise made by the bellowing, the trampling, and galloping, of a large herd of bisons, as impressing the mind with an emotion amounting to terror. The Bison was the only native animal of the ox kind found by the first settlers in America.

BITTERN: of this bird there are several species, foreign and domestic. They generally inhabit marshes along the borders of salt and fresh waters, living upon fish, frogs, snails, and worms. The Common European Bittern is two feet four inches long. It has a booming cry at night, which may be heard at the distance of a mile, thrilling the listener with a strong sense of loneliness and desolation. The American Bittern inhabits most parts of North America, and is frequently met with in the vicinity of Fresh pond, near Boston. Its cry seems to be a hollow calling out of *pump ah gah.* It rarely makes its appearance till the approach of night.

The Green Heron, or Bittern, is also an American bird, flying both by day and night, and loving to dwell in gloomy swamps and marshy retreats. It is often seen along the borders of rivers, and is known by a name which we do not choose to mention. The Small Bittern is still less in size, and inhabits the middle states. The Least Bittern is a foot in length. It is a silent bird, and inhabits the neighborhood of fresh waters, in the United States and West Indies.

BLACKBIRD: a species of thrush and a favorite songster, found in the temperate parts of Europe and Asia. It is frequently mentioned by the descriptive poets of England and Scotland. Its plumage is black, with a yellow circle round the eyes. Its length is nine inches. Among the American Blackbirds, the most common is the Crow Blackbird, or Purple Grakle, which is often seen in flocks, containing almost an incredible number. They breed in our orchards during the summer, and retire to a southern climate in winter. Sometimes the noise of a flock of these birds when rising upon the wing sounds like thunder, and alighting on the skirt of a leafless forest, they give it the appearance of being clad in mourning. Their notes sound like a distant cataract. This bird is a great thief in the corn fields at planting time. The Red-winged Blackbird, though of a different genus, often keeps company with the Crow Blackbird and the Cow Blackbird. He is called a starling by Wilson, but seems to belong to the Troupials. He is black, with bright red spots upon his wings. He passes the winter in the south, feeding in the rice and corn fields, and in the spring visits the north, where the flock assembles in low meadows, making them resound with their notes, which are a sort of mingled chattering and warbling. They build their nest upon the ground, amid the long grass.

BLACKCOCK, or Black Grouse, is a splendid bird, inhabiting the colder parts of Europe. It is one foot ten inches in length, and subsists upon seeds, berries, and insects.

BLACKFISH, or Tautog, is common along the northern shores of the United States. It is abundant about Newport and New London. It sometimes weighs fifteen pounds. It is greatly esteemed for the table.

BLEAK: an European fish, five or six inches long. It tumbles about in the water at some seasons in such a manner, that the Thames fishermen call them Mad Bleaks. Artificial pearls are made of their scales.

BLOODHOUND: this dog is tall and beautifully formed, of a reddish brown color. It was formerly in high esteem in England. Its scent being very acute, it was employed in hunting robbers, or in recovering stolen game. In the Spanish West India islands, it is constantly used in pursuit of criminals.

BLUEBIRD: this bird is a general favorite. He is seven inches and a half long, of a beautiful blue color, with a reddish breast. He is found all over the U. States, in the Bahama islands, where many of them winter, and in Mexico, Brazil, and Guiana. Early in March he returns to his old haunts round the barn and orchard, and repeats his feeble but pleasing warble, with open and quivering wings. His food consists of insects, particularly beetles and spiders. He departs for the south in November.

BOA: this serpent has been known to measure twenty, thirty, and even forty feet in length. There are several species, as the Boa Constrictor, Ringed Boa, Anaconda, &c. The Boa is found in Africa, India, and S. America; the Ringed Boa inhabits Surinam, and the Anaconda S. America. They are all generally of a light brown color, spotted, and bordered with black. Their muscular power is truly wonderful. The buffalo, stag, and man himself, sometimes become victims of their rapacity. These serpents reduce their prey to one uniform mass, by crushing it in their spiral folds. They then lubricate it with some mucilaginous substance, so that it may slip down more easily; and distending their jaws, they swallow the body by one gradual and long-continued effort.

BOAT-BILL: a S. American bird, twenty-two inches long, of an ash color.

BOBOLINK: see Rice-bird.

BREAM: an European fresh water fish, two feet and a half long, of an olive color. The American Bream, or Pumpkin-seed, is common in our ponds and rivers, and is six or seven inches long.

BRET: a river fish, common in New England, one inch and a half long.

BUFFALO: an animal greatly resembling the ox, but with a body somewhat thicker and shorter. His figure is clumsy, his looks stupidly wild, always inclining his head towards the ground. His color is nearly black, and his tail is tufted at the end. His horns are flattened, and turned downwards. Herds of buffaloes are found in a wild state in Africa and India; in the latter country they sometimes do great mischief in the cultivated lands. They are domesticated in Greece and Italy, and take the place of our horned cattle. The oxen are stronger than ours, and the cows yield more milk, but it is not so good.

BUG, or Bed-bug: a nauseous insect that infests the beds of careless housewives. Its body is divided into three parts, and it has two small brown eyes. There are several different species. This bug is destitute of wings. The Field Bugs are very various, and have wings. The largest species is the Surinam Bug, which is three inches and a half long. It is very voracious and destructive, devouring frogs, toads, birds, and fish.

BULL: the male of the Cow kind. See Ox.

BULL-DOG: a very fierce species of dog, with a large head, a short nose, and the under jaw longer than the upper. The English bull-dog is possessed of great courage and prodigious strength; four of them are said to be able to master a lion.

BULLFINCH: of this bird there are several species, in Europe, Asia, and America. They have a short, strong beak, and live upon hard seeds. They are familiar birds in England and Scotland, but are rare in the United States. The Pine Grosbeak, or Pine Bullfinch, visits the United States and Canada in hard winters, but dwells generally in more northern regions. The Crimson-fronted Bullfinch is found on the plains of the Arkansas. The Bullfinches possess fine musical talents. In Europe, they are taught to whistle tunes, and speak some words.

BULL-FROG: an amphibious animal, dwelling along the margin of ponds and other stagnant waters. It is three or four times as large as other frogs, and derives its name from its voice, which resembles the bellowing of a bull. The sounds which issue from these creatures at night in marshy places is sometimes frightful. They are common in the warm and temperate parts of this continent.

BUNTING: of this bird there are several species in Europe and America. They live in pairs, or move in small flocks, living on farinaceous seeds. The Snow Buntings commonly inhabit the arctic regions, but as winter approaches, visit more southern climes. Their color varies with the season, though there is generally a predominance of white. They are seven and a half inches long. They are often called the White Snowbird, to distinguish them from the bluish sparrow, which is also called Snowbird.

The Black-throated Bunting is six inches long, and is common throughout the United States, making his music heard from every field during the warm season.

BUSTARD: this bird inhabits Europe, and seems to be a link between the Ostrich and Domestic Fowl. It is heavy, awkward, and extremely shy. The Great Bustard is three feet three inches long, of a bluish gray color. It frequents the extensive plains of England and Scotland, living upon berries, grain and insects. When hunted by the sportsman, it rises on the wing, and just grazes along the ground. The Little Bustard resembles the former, and is a foot and a half in length. There are several other species, none of them inhabiting America.

BUTCHER-BIRD, or Shrike: of this bird there are many species. They all have a very strong and hooked bill, which they use for tearing their food, which consists principally of insects, though they often attack small birds. They are pretty good songsters, and imitate the notes of other birds. They are found in all parts of the world. The most remarkable species is the Great American Shrike, which closely resembles the Great Butcher-bird of Europe. It inhabits the northern parts of America, and is ten inches and a half in length, of a slate color, with black wings. This bird has a singular habit of impaling his prey upon thorns, and often kills many more than he can eat. He is bold and fearless, and has been known to enter a room in search of caged birds. The Loggerhead Shrike resembles the preceding, and is nine inches long. It is very shy and retiring, and inhabits only the warmer parts of the United States.

BUTTERFLY: of this gay, beautiful insect there is a countless variety, some larger and some smaller, and they may be found in all parts of the world; but those of warmer climates are the largest and most beautiful. Their wings are four in number,

THE CAMELOPARD, OR GIRAFFE.

beautiful, and its eyes soft and animated. In its native country, the Giraffe subsists upon the twigs of trees, particularly those of the mimosa genus. It can with difficulty take food from the ground. Its gait, when it walks, is neither awkward nor unpleasing; but when it trots, its long neck, swaying backwards and forwards, presents a most ridiculous picture. It defends itself from its enemies by kicking its heels, which it does with such rapidity as to keep even the lion at a distance. It is said to make no noise whatever, and appears to be both useless and harmless.

CANARY BIRD: this well-known little songster is of the finch genus, and is a native of the Canary islands, and also of Cape Verd and Madeira. It is about five inches long, and is of a variety of colors, some being yellow, some white, and some mottled and shaded with green. It has been diffused over almost every civilized country, on account of the charms of its song, and its great docility. In its native islands, the Canary is of a dusky color, and is not so beautiful as it is in confinement. It is a social and familiar bird, and is often much attached to the person who owns it. It is also capable of being taught most extraordinary feats.

CARACAL: this animal is the Lynx of the ancients, and is found in Arabia, Africa, and Asia. It is somewhat larger than a fox, and much fiercer and stronger. It is of a reddish color above, and white beneath. It generally subsists upon the refuse of the lion's meal, and for this purpose it follows that animal from place to place. When this resource fails, it will sometimes attack hares, rabbits, and birds.

CARP: this fish is about twelve inches long, of an olive color. It is found in the lakes and rivers of Southern Europe. It is very cunning, and is styled the River Fox. It will frequently jump over the nets placed to catch it, and will sometimes escape by burying itself in the mud. This fish sometimes grows to a large size, and are a great article of commerce.

CASSOWARY: this bird, which in some respects resembles the Ostrich, is five feet and a half long. The body is black and hairy, the neck and head naked, and of a bluish color; the legs muscular, and the wings unfit for flight. It has a horny protuberance upon the head. It is found in India, feeding upon herbs, seeds, and insects, in fields and desert places. It runs with great celerity.

CAT: the domestic cat is of various colors, generally marked with stripes or spots of black, red, and white. It is a variety of the Wild Cat, rendered tame by domestication, and found in almost all countries. It was not originally found in America, but was brought over by the first settlers. One of the most remarkable properties of the domestic cat is the anxiety with which it makes itself acquainted with every part of its usual habitation. It surveys every room in the house, and every article of furniture, and when once it has acquired a knowledge of its situation, it appears contented. It is more fond of places than of persons, though cats have shown in some instances strong attachment to their masters, or to those who treat them with kindness. The memory of a cat is very strong, as it never forgets a place it has once resided in. The Wild Cat lives in the woods, and has longer hair than the tame variety. It climbs trees with great facility, and preys on birds, bats, and small quadrupeds. The animal called Wild Cat in this country is the Canada Lynx, having a tail three or four inches long.

CAT FAMILY: the animals belonging to this family are very numerous; they are the Lion, Tiger, Panther, Leopard, Puma or Cougar, Jaguar, Ounce, Ocelot, Cape Cat, Lynx, Margay, Servoal, Wild Cat, Cat, and many others.

CATBIRD: this bird is nine inches long, of a dark slate color, with a black tail. He is of the thrush genus, and, like all of these birds, is a powerful and pleasing songster. He is found in nearly all parts of N. America, at different seasons. His song is heard before break of day, made up mostly of quaint imitations of other birds, interspersed with his own original note, which is so much like the mewing of a cat that it might almost be taken for the cry of that animal. This noise is so unpleasant, that in spite of his familiar manners and pleasing song, he is disliked and abused by every boy in his vicinity. His movements are very amusing, composed of odd jerks and wily attitudes. He feeds on insects, worms and fruits. He is easily domesticated, and seems attached to his cage and his keepers.

CATERPILLAR: of these creatures there are great multitudes, of different sizes, shapes, and colors; but they are all brought to life in the same manner, and all undergo the same changes. The various kinds build different sorts of habitations, some of which are very curious. Many of them live alone; others form large companies, and live together. When these creatures have lived a while as caterpillars, they prepare for their wonderful change. Some weave themselves a silk case, which they conceal with leaves; some hide themselves under ground; while others creep into a hole or corner, and hang themselves up. When the moment of change approaches, the caterpillar bursts its skin by a great effort, and the chrysalis appears. This now by an astonishing process frees itself entirely from the old skin, and crawling into the silk net, remains without motion for some time, until at length it bursts its coffin, and comes forth a gay, brilliant butterfly, fitted to roam from flower to flower, on light and buoyant wings. See Insect.

CEDAR BIRD, or Cherry Bird: this beautiful bird is about eight inches long, of a brownish gray color, with an elevated crest upon the head. The tail is tipped with yellow, and the wing feathers are curiously ornamented with small vermillion spots, resembling sealing-wax. It is found throughout N. America, and sometimes it wanders to the forests of Cayenne. It feeds upon fruits, berries, insects, and worms. It is very sociable, moving in flocks or companies, ten or twelve sometimes settling on the same tree. It is sometimes called the Canada Robin, and is distinguished for silky softness of plumage, gentleness of disposition, innocence of character, and extreme sociability. Its flesh is much esteemed. It very much resembles the Waxen Chatterer.

CERASTES: this viper, sometimes called the Horned Viper, is of a grayish color, with a small horn over each eyebrow. It is about two feet long, and is common in Egypt and Abyssinia. It keeps itself concealed in the sand. Its bite is very dangerous. It moves with great rapidity and in all directions. When it wishes to attack a person at a distance, it creeps towards it sideways, and then, when within a few feet, springs upon him, and inflicts a deadly wound. Many writers affirm that some of the natives of the countries where these dangerous creatures are found, handle them with impunity, and even suffer themselves to be bitten. This still remains a mystery.

CHAFFINCH: this bird is about six inches long, of a chestnut color, with the neck and head ash-colored. It is found in all parts of Europe. It has a short and sweet warble.

CHAMELEON: this curious reptile is not scaly like the lizard, but is covered with small, smooth protuberances. There are six or seven species, all inhabiting Africa, India, the W. Indies and other warm regions. They are generally from six to ten inches long. The eyes move in every direction, independently of each other. The tongue is very long, and covered at the end with a glutinous substance. To this the insects adhere, when the creature darts his tongue out, which he does with great rapidity. The feet have five toes, three in front and two behind, to enable him to take a firm hold of the tree upon which he is crawling. His movements are quite ludicrous, for with a slowness like that of the hand of a clock, he carefully puts forth his awkward legs, and grasps a neighboring branch. Here he often sits for days together, living on the insects that come within his reach; and from the small quantity that he eats, the fabulous story of living on air has arisen. The story also of his changing to the color of the object upon which he is placed, is an error. It is true that many changes take place in his color, in different situations; in his natural state, his color is a fine green; when in anger, the hue becomes bluish and dark; and when ill, the color changes to a yellowish gray. When the sun shines, the color of the chameleon is more lively than at other times.

CHAMOIS: this quadruped is of the Antelope genus. It is three or four feet long, of a fawn color. It has a short tail and long perpendicular horns, hooked at the ends. It is found in the mountains of Switzerland. It is very lively and active. The cry of this animal is not distinctly known. When it is frightened, it makes a sort of hissing noise, and strikes the ground forcibly with its foot, bounds from rock to rock, turns and looks round, and then flies with the utmost speed. It feeds upon the choicest herbage and the most delicate plants and buds. The hunting of the Chamois is very difficult and dangerous, but nevertheless it is pursued with the greatest ardor, even by those who have lost many friends in the perilous chase.

CHATTERER: of this beautiful bird there are three or four species, one inhabiting S. America, one common to parts of both continents, and one peculiar to Japan. The Waxen Chatterer, which inhabits both continents resembles the Cedar Bird in its form and habits. It has the same sociable and affectionate disposition, and subsists on the same food. It is found in the vicinity of the Rocky mountains.

CHEVROTIN, or Pigmy Antelope: this quadruped is about nine inches high, of a bright bay color, and is very active and graceful. The legs are hardly larger than a quill. It is found in the warmest parts of Africa.

CHIMPANSÉ: this ape is about three feet in length. His fur is black, and thinly covered with long black hairs. His mouth and ears are very large. He is found in Africa, particularly in Guinea and Congo. The Chimpansé is said to resemble man in organization more than any other animal. It is very intelligent, and capable of some education. It lives in troops, constructs huts of branches, and repulses its enemies with clubs and stones. It may be taught to walk upright and sit down like man.

CHINCHILLA: this pretty little animal is a kind of mouse, and is about eleven inches in length, with a very long tail. It is found in Chili. Its fur is of a beautiful gray color, mottled with white, and is much used for caps, muffs, &c.

CHOUGH: this species of crow resembles the English jackdaw. It is of a black color, and nearly as large as a crow. It is only found in the western parts of England. It frequents old churches and castles, feeds upon grain and insects, and lives in flocks.

CHUB: a fish found in Europe and America; it is not much valued for the table. It is about a foot in length, and is found in streams. It is taken with a hook.

CHUCK-WILL'S-WIDOW: this peculiar bird, resembling the whip-poor-will and night-hawk, is a species of goat-sucker, and is found in all the warm parts of America. It is twelve inches in length, mottled with brown, red, black, and white. It has an enormous mouth, bristled with hair. It never moves till the evening, when it commences repeating the syllables which compose its name, in a very slow and loud tone, which may be heard at the distance of half a mile. Its flight is low, and it frequently settles upon fences, whence it sweeps round in search of insects. It lays its eggs on the ground in the woods.

CIVET: this quadruped is two or three feet in length. The hair is long and of a brownish gray color. It is a native of the warm parts of Asia and Africa. There are three species, all of which are provided with bags for the secretion of a musky perfume, which is very much esteemed, and forms a considerable article of commerce. The Civet is wild and fierce, and is never quite tamed, though many of them are bred for the sake of their perfume, particularly in Holland. It is light and active, and lives upon birds and small animals. It generally preys by night. The Javanese Civet and the Zibet both differ considerably from the common Civet in appearance.

COAITA: this American ape is the largest of the Sapagous. He is of a black color, and inhabits Guiana and Brazil. He is about a foot and a half long, with a tail two feet and a half long, which nearly answers the purpose of a hand. The animal twines this tail around objects too distant for him to reach with his paws, and also suspends himself by it to the branches of trees. He feeds upon fruits, fish, worms, and insects.

COATI, or Coatimundi: of this quadruped there are two species, inhabiting S. America, one of a brilliant red color, and the other brown. The latter is smaller than the raccoon, with a long snout, movable at the end, and a tail longer than his body. This tail in cold weather itches to such a degree, that the animal gnaws it till inflammation sometimes takes place and destroys his life. Hence the opinion that the Coati eats his tail. He subsists on animal food, climbs trees in search of birds and their eggs, and destroys poultry and small game.

COAL-FISH: this fish inhabits northern seas. It is black above and silvery below, and varies from six to thirty inches in length. It is known under various names.

COBRA DE CAPELLO, or Hooded Snake: of this serpent there are five or six different species, all equally dangerous, and inhabiting the E. Indies. They are generally from three to eight feet long; the eyes are fierce and full of fire. They can inflate the skin of the head to such a degree, as to cause it to appear like a hood. They are called dancing snakes in India, and are carried about in baskets by men, who play some simple airs upon a flute, with which the snakes seem much delighted, and to which they keep time by graceful motions of the head.

COCHINEAL: this little insect is of an oval form, of the size of a small pea, with six feet, and a snout or trunk. It is of a blackish red color, and scarlet within. When once placed upon a plant it is stationary, feeding upon the juices, which it draws by means of a tube placed in the breast. It is a native of Mexico, but is now cultivated not only in that country, but in different parts of S. America. It feeds upon the nopal tree, which is reared for the purpose in immense numbers. The insects are brushed off by women with the tail of a squirrel or stag; they are then killed by being thrown into boiling water, and dried upon hot plates or in the sun. The natural dye which this little insect affords is a deep crimson. The best cochineal comes from Mexico; an inferior species is produced in India.

COCK: the domestic Cock is the origin of all the varieties of the domestic fowl, and is supposed to have come originally from Asia. It is spread over the whole civilized world, and has every variety of color, feathers and combs. It was brought to America by the first settlers. It is found wild in India and Java, with some variations in color and appearance. No creature has more courage than the cock, and in most parts of the world cock-fighting is a great diversion. In England, it is not thought so much of as formerly, but in China and India it is still the foolish amusement of kings and princes.

COCK OF THE WOOD, or Wood Grouse, is about two feet ten inches long, of a dusky color, marked with gray. It is found in the woody and mountainous regions of the north of Europe and Asia. It feeds upon seeds, berries, insects, and the tops of evergreens. It builds its nest on the ground, of branches of pine.

COCKATOO: this bird is of the parrot kind, having a crest upon his head, which gives him a fine appearance. There are three or four different species, inhabiting the Moluccas and New Holland. They can all utter sentences, when taught, with great volubility. They delight in marshy places, and live upon seeds and vegetable substances. Their plumage is very brilliant and diversified.

COCKCHAFFER: this insect is sometimes called the Dor Beetle and the May Bug. It undergoes very curious transformations, being for several years a worm under ground, devouring roots and grass with the greatest voracity. It has no eyes, but merely two feelers to direct its motions. At the end of the fourth year, it changes into the busy Cockchaffer. Its life only lasts the season, during which it makes great devastation upon the leaves of trees. Sometimes their number is so great as to eat up nearly every vegetable production in their way.

COCKLE: of this tribe there are more than fifty species, which may be found on the sandy shores of almost all seas. The Cockle has the power of moving with considerable facility, owing to its foot, with which it draws itself along. The Common Cockle is wholesome and pleasant food.

COCKROACH: this creature, of which there are many species, is one of the most mischievous and disgusting insects in the world. In old houses they swarm by hundreds, behind trunks and boxes, and in dark corners, destroying all sorts of clothing, books, paper, and other things. The Gigantic Cockroach is found in Asia, Africa, and S. America, and is a great pest.

COD: this fish is at the head of the wandering tribe of fishes; it is gray, with yellowish spots, and is sometimes more than five feet long, but generally is from two to three feet. It is found in the northern seas. The Cod fisheries have for ages been of great importance. The chief place of resort for these fish is on the banks of Newfoundland. Here they annually repair in numbers beyond the power of calculation, to feed on the worms which they find on the sandy bottom. They are taken by fishermen in such quantities as to supply both Europe and America. An expert fisherman will sometimes take four hundred a day. Before the discovery of Newfoundland, the principal fisheries were in the Iceland seas.

CONDOR, or Great Vulture of the Andes, is of a blackish color; the head and neck are bare of feathers and covered with a hard, wrinkled, reddish skin. On the top of the head is an oblong comb or caruncle, and around the neck is a sort of ruff of white feathers. The Condor is found throughout the whole range of mountains which traverses the American continent. It is the largest of the vultures, and is about three feet in length, and eight or nine feet from the tip of one wing to the other. It resides in lofty rocks near the boundary of perpetual snow. The habits of this bird partake of the bold ferocity of the eagle and the disgusting filthiness of the vulture. Although, like the latter, it prefers a dead carcass, yet it often makes war upon living animals. Two of these birds will frequently attack a cougar, a calf, or even a full-grown cow. They pursue the poor animal, lacerating it incessantly with their beak and talons, till it falls exhausted. The Indians catch them with the lasso after they have gorged themselves with prey, and this sport is held by them in particular estimation. The report that the Condor carries away children is proved to be unfounded.

CONEY: this little quadruped, the Coney of the Sacred Writings, inhabits holes in rocks, and feeds on vegetables, roots, and fruits. It is found in Asia, at the Cape of Good Hope, and in Abyssinia. It is about two feet long, of a grayish brown color above, and white beneath.

CONGER: of this genus there are three species, one called the Conger Eel, inhabiting the northern seas, and the other two found in the Mediterranean. The former is generally five or six feet long, and is extremely voracious. It sometimes grows to a very large size, weighing a hundred pounds.

COOT: the body of this water bird resembles that of a duck, but the bill is narrow and pointed. There are several species. They reside almost entirely in the waters of gulfs and bays, not venturing into deep and open seas. They feed on insects and aquatic vegetables. The Common Coot of Europe is about fifteen inches long, of a slate color, with a black head and neck. The American Coot resembles the preceding. There is a species in Madagascar of a dusky blue color, with red, green, and yellow rings above the knee, and a red comb upon the head.

CORMORANT, or Corvorant: of this bird there are several species; the Common Cormorant, the Green Cormorant, or Shag, the Crested Cormorant, the Dwarf Cormorant, and African Shag. They all swim well and are expert divers. They feed on river fish, and particularly upon eels. They are generally from twenty to thirty inches long, of a blackish gray color, with a thick and heavy body. They are very voracious, continually eating, and apparently never satisfied. Such is their power of catching fish that they have been trained in England to catch them, and are still used for that purpose in China.

CORN-CRAKE: see Gallinula.

COUANDO: this species of Porcupine is smaller than the common European Porcupine, being about two feet in length. It is found over a great part of the American continent. It sleeps all day, and only moves out at night, feeding upon birds and small animals; differing in this respect from the common Porcupine, which feeds upon vegetables and fruits. It climbs trees easily, and commonly lives in high places.

COUGAR, or Puma: this quadruped is peculiar to America. It is of a fawn color, without a mane or tuft at the end of the tail, and is from three to five feet long. Notwithstanding its size and strength, it is cowardly, and, like all cowards, sanguinary. It will frequently suck the blood of a whole flock of sheep. It seizes its prey like other members of the cat family; it crouches and crawls softly through the bushes, and then suddenly leaps upon its victim and tears it in pieces. It is taken by the lasso on the plains of S. America. It is easily tamed, and becomes very tractable, and even fond of its keeper. This animal was formerly common in all parts of the United States, where he passed under the various names of Panther, Painter, and Catamount. He is now seldom met with, except in the mountains, and remote western regions.

COW: see Ox.

COW BLACKBIRD: this bird, which is a species of Troupial, and sometimes called the Cow Troupial, or Cow Bunting, is found in nearly all parts of North America, at different seasons, being constantly flitting about. It is of a blackish brown color, and about seven inches long. It feeds industriously upon worms and insects, and is very familiar around the cattle, picking and scratching for seeds. Like the European Cuckoo, it deposits its eggs in the nests of other birds. Its song is guttural, uttered with an air of affectation, and a bristling of the feathers. Sitting on the top of a lofty branch, the male bird amuses himself with an occasional *kluck tsee;* accompanied by his mates, he endeavors to amuse them by his complaisant chatter, seeming as proud of his uncouth jargon as most other egotists. This bird resembles the Red-winged Blackbird, and is often seen in company with it.

CRAB: of this creature there are many species, some inhabiting the land and some the sea. They all cast their shells. The Common Crab is an exceedingly quarrelsome animal, and when he has seized upon his opponent, he had rather lose his claw than forego his hold. He is of a dirty green color, and red when boiled. He inhabits all shores, and burrows under the sand. Of the land Crab there are many species, of different sizes and colors. The principal is the Violet Crab, which is much noted for its curious shape, the delicacy of its flesh, and its singular manners. These creatures live upon leaves, fruit, and rotten wood, which they cut by means of two broad, sharp teeth, with which they are provided. They live in societies among the mountains, but once a year march down to the sea-side to deposit their eggs. They sally forth by thousands from the clefts of rocks, and from holes dug in the earth, and direct their march directly to the sea. They never deviate from their prescribed route except to wind along the courses of rivers. They march in three battalions, generally in the night, and usually when it rains. The Soldier or Hermit Crab makes the same annual migration to the sea-side and there changes its shell, and takes possession of a larger one. It is seen stopping at one shell, turning it, and passing it by; then going to another, and another, till at last, finding one sufficiently large and convenient, it relinquishes its old shell, and takes up its abode in the new one, till it is again obliged to search for a larger one.

CRANE: of this genus there are many species, only one of which is indigenous to Europe. They frequent marshy places, subsisting on herbs, seeds, worms, and frogs. They migrate in vast flocks, and perform very extensive journeys by night, uttering shrill cries. At these times they are arranged in long triangular lines, headed by a leader. The Common European Crane is generally three or four feet long, of a grayish color. The Balearic Crane is bluish, with the head black and adorned with a yellow crest, the wings being white. It is remarkable for the lightness and elegance of its proportions, and the grace of its attitudes. As it runs it stretches out its wings, and goes very swiftly. It resembles the peacock, and has been sometimes described under the name of the Sea Peacock. It is found on the coast of Africa and the Cape Verd islands. The Whooping Crane is a stately bird, and is white, with some black upon the wings. It is about four feet in length and five feet high. It is found in almost all parts of N. America and the W. Indies. These birds, like all the rest of the family, dwell amidst marshes and muddy flats near the seashore, feeding on reptiles, fish, and worms. They fly very low, just skimming along the ground, in search of prey. At times, they utter a loud and piercing cry or whoop, from which the name is derived. When assembled for their migration to the south, the clang of the countless multitudes passing along high in the air is almost deafening. The flight takes place in the night, the birds passing down the valley of the Mississippi, towards the W. Indies, where they pass the winter. The Brown Crane resembles the preceding, and is spread throughout North America. It is of a blackish brown color. The Great White Crane is found in the swamps of E. Florida, and also resembles the Whooping Crane in appearance and habits. The Numidian Crane, called the Buffoon Bird and the Demoiselle, is a very scarce bird, inhabiting Asia and Africa. It is about three feet long, of a bluish gray color, with fine white feathers upon the back part of the head. Its gestures and contortions are very singular. It stoops, rises, lifts one wing, then another, turns round, and sails forward and then back again, to the great amusement of those who witness these feats.

CREEPER: of this bird there are several species. They all climb trees like woodpeckers, supporting themselves by the stiff pointed feathers of the tail. They feed on insects, and make their nests in the holes of trees. The Common Creeper of Europe is of a yellowish brown color, and is about five inches and a half long. The Brown Creeper is found in the United States, but it is not common. It is about five inches long, of a brown color. It feeds upon insects, which it picks from the bark of the pine trees, going leisurely up and down the tree in straight lines. It also feeds upon seeds. Its habits differ from those of the European bird, though some naturalists suppose it to be the same.

CRICKET: of this insect, which resembles the grasshopper in shape, there are many species, all of a rusty brown color; some inhabiting houses, and some the fields. The Chimney Cricket is a most inoffensive creature, making its voice heard near the kitchen hearth in the winter. It is of a very chilly nature, seldom leaving the fireside. It is also voracious, and will eat bread, sugar, and flour. Except in the very coldest weather, it never ceases cheruping. The Field Cricket makes its appearance at sunset, and sitting at the mouth of its burrow, cherups its evening song; but as it is shy and cautious, it is but seldom seen.

CROCODILE: of this formidable reptile there are seven or eight species, differing in size, but resembling each other in their form and habits. The Common Crocodile has been known from the earliest times. It is of a blackish brown color above, and a yellowish white beneath. It is from twenty to thirty feet long, and inhabits the rivers of Africa. It has the form of a lizard, with an elongated and flattened head, rounded at the extremity. The whole body, with the exception of the top of the head, is covered with scaly plates. The strength of the Crocodile is very great. Its principal instrument of destruction is the tail, with a single blow of which he will overturn a boat, and then seize upon the unfortunate men who conduct it, for his meal. Although not so powerful upon the land, yet it is still very terrible. It keeps along the coast, and concealing itself among the sedges, waits the approach of man and animals. These it quickly seizes with its teeth and claws, and dragging them to the water, easily drowns them. The eggs of the Crocodile are deposited on the sandy shores of rivers, to be hatched by the heat of the sun. The young ones instantly take to the water, but great numbers of the eggs and young are destroyed by other creatures. This reptile is supposed to be the Leviathan of the Sacred Writings. The Sacred Crocodile is of a green color with black spots, and about five feet long. This animal is the sacred Crocodile of the Egyptians, and held in great veneration by them. The Gavial or Gangetic Crocodile inhabits the river Ganges. See Gavial.

CROSS-BILL: the birds of this kind inhabit the north of Europe and America, and feed on the seeds of the pine and fir trees. Their singular bill, the mandibles of which cross at the point, enables them to extract the seeds from the cones of the pine trees. The Greater or Paroquet Cross-bill is seven inches long, of an olive ash color, and at times of a scarlet red. It is found in the north of Europe and America, where it dwells in pine forests. The Common Cross-bill is about six inches long, of a greenish yellow color, varying at different times. It inhabits the high and Arctic regions of both continents, feeding upon the seeds of the white pine and hemlock spruce. It has a loud, sharp note. During heavy snows, it becomes so tame from hunger as to alight in flocks like pigeons around the mountain cabins. At these times they may be easily knocked down with a stick. The White-winged Crossbill is about five inches and a half long, of a dark crimson color, with white bands upon the wings. Its habits are like those of the preceding bird.

CROW: there are many species of this bird in different parts of the world. Their sense of smell is very perfect, and they are characterized by great cunning and a disposition for theft. They may be taught to speak and obey the voice of their master. The principal species are the Raven, Carrion Crow, Hooded Crow, Chough, or Red-legged Crow, Fish Crow, Jackdaw, and Rook. The Carrion or Common Crow may be found in most parts of the world. It is smaller than the Raven, of a deep black color. It is very abundant and troublesome in N. America; the most serious mischief it does is in the corn fields. It picks up and roots out the sprouting grain, in planting time; and in the autumn, when it is ripe, whole flocks infest the fields, and do extensive damage. It also feeds on carrion, fruits, and shell-fish, which it breaks by dropping them on a hard surface from a height. The Hooded Crow is of an ash color, and twenty-one inches long. It is a European bird, and is remarkable for its double cry, one of which is hollow, and the other shrill, like the crowing of a cock. It lives on worms, grain, and carrion, and often resorts to the sea-shore for what may be thrown up by the tide. The Fish Crow is about sixteen inches long, of a glossy black color, and resembles the European Rook. It is peculiar to America, and passes its time near rivers, where it subsists upon dead and living fish and water lizards. It attends the fishermen of New Jersey, for the purpose of picking up the refuse fish.

CUCKOO: this bird is of a shy and solitary nature, living on insects, and remarkable for laying its eggs in the nests of other birds. There are many species in different parts of the world. The Common Cuckoo of Europe is about ten inches and a half long, of a bluish gray color, with the under parts white. It does not pair, but deposits its eggs one by one in other birds' nests, particularly in those of the wren and wagtail. Here the intruder is hatched and fostered by the deceived bird, and then repays her kindness by throwing the young brood out of the nest to die. The note of this Cuckoo is exceedingly plaintive, and consists of the word *cuckoo* very distinctly pronounced. The American or Yellow-billed Cuckoo is of a grayish brown color above, and white beneath. Unlike its European namesake, it seeks out a mate, and builds its nest in a slovenly manner, in a small tree in deep woods. When the young are hatched, the parent bird is very affectionate and assiduous, fluttering, feigning lameness, and frequently uttering guttural sounds as if choking, to draw any intruder from her nest. Sometimes this bird deposits her eggs in other nests. The male-bird has a monotonous note, from which he derives his name, sometimes uttered in a plaintive manner, and at other times resembling the grating of a watchman's rattle. As this note is more clamorous at the approach of rain, the bird has received the name of Rain Crow. It makes great devastation among the eggs of other birds, upon which it principally feeds. The St. Domingo or Black-billed Cuckoo resembles the preceding in habits and appearance, but is less timid and retiring.

CURASSOW: this is a S. American bird. There are several species, all of them bearing great resemblance to the pheasant. They are of the size of a small turkey, and have generally a crest of feathers upon the head, which can be raised and depressed at will. The Crested Curassow is of a black color, glossed with green. The Galeated or Cashew Curassow has a blue tubercle resembling the cashew-nut at the base of the bill. It is of a shining blue color, with white upon the wing feathers. The Razor-billed Curassow derives its name from a horny substance that surmounts the bill, very sharp at the edge.

CURLEW: the birds of this genus are very shy and wary, dwelling near the sea and frequenting marshes, feeding upon worms, frogs, and shell-fish. Their voice is low, plaintive and whistling. The species are spread over the whole globe; three are peculiar to the old continent, and three or four to America. The Common Curlew of Europe is about two feet long, of an ash color, with a bill five or six inches long. This is admirably fitted for picking out worms and small crabs from the sand; it also serves as a weapon of defence. The Long-billed Curlew is about twenty-five inches long, with a bill seven inches in length. It is of a blackish brown color, spotted and barred with different colors. It is found throughout N. America. These birds fly high and rapidly, in the manner of wild geese, uttering as they fly a loud, short, whistling note resembling *kurlew*. Their food consists of insects, worms, and small crabs. Their flesh is esteemed superior to that of almost any other bird for the table. The Esquimaux or Short-billed Curlew strongly resembles the European Whimbrel. It is about a foot and a half long, with a bill about three inches long. It is of a brownish black color. Its habits are like those of the Long-billed Curlew, feeding on the same food, and making, like that bird, migrations in great numbers. Its flesh is very delicate. The Small Esquimaux Curlew is about fourteen inches long, with a bill about two inches and a quarter in length. The plumage is of a brownish black color. Like the other species, it is gregarious, and on starting to wing, a sort of watch-cry is heard, resembling the whistling pronunciation of the word *bee-bee*. It is found in almost all parts of the American continent.

CUSHAT: the Ring-dove.

CUTTLE-FISH: this singular creature, which is about two feet long, has eight arms or claws, and two tentacula; with these it lays fast hold of any thing that comes in its way, and when once it seizes any thing, it is difficult to loosen its hold. The body is of a reddish brown color. The eyes are as large as those of a calf, and surrounded with silvery rings. The mouth is horny, and hooked like the bill of a parrot. It is so strong that the animal can break to pieces the shells of the animals on which he feeds. When he is pursued, he squirts out a black liquor, which, rendering the water as black as ink, enables him to escape his enemy. The Romans used this liquor for ink. There is a bone in this animal which is converted into that useful article of stationary called pounce. If this fish be taken into a dark room and cut up, it is said to illuminate the whole place. When taken out of the water, it makes a noise resembling the grunting of a boar.

D.

DAB: a European fish, six or eight inches in length, resembling the flounder.

DACE: a fish about eight inches long, found in the rivers of Europe and the U. States.

DARTER: of this singular bird there are only two species, the Black-bellied Darter and the White-bellied Darter. They live in fresh water, at a distance from the sea. They never walk, nor remain long on the wing. They perch on trees that hang over the water, and when startled, drop down, and sliding into the stream, re-appear at a distance; their head only being visible, which has very much the appearance of a snake. They feed on fish, which they catch by darting at them with their long necks and sharp bills. They are found in the warm climates of both continents, and are sometimes called Snake Birds.

DEATH-WATCH: this is a dusky, hairy insect, about a quarter of an inch in length.

Notwithstanding its small size, this creature is often the cause of serious alarm among the lower classes, from the noise it makes, resembling the ticking of a watch. Wherever it is heard, it is esteemed portentous of death to some of the family in the house. This noise is nothing but the call of one insect to another, and is made by the insect's beating any hard substance with the fore part of the head. When knocking, the death-watch raises itself on its hinder legs, and with the body somewhat inclined, beats with great force against the place on which it stands. The number of successive strokes is generally from seven to eleven.

DEER : of this animal there are five kinds in North America; the Common or Virginia Deer, which abounds in the wooded districts from Canada to Mexico; the Black-tailed or Mule Deer, inhabiting the vicinity of the Rocky mountains; the American Elk or Wapiti, inhabiting the Western states and territories, and Canada; the Moose, found in Canada, and the northern border of the United States; and two varieties of the Reindeer—the Barren-ground Carriboo and the Woodland Carriboo, both of them inhabitants of the northern regions. There are still supposed to be one or two other species, but they are perhaps only varieties of the Mule Deer, or Virginia Deer.

The Virginia Deer resembles the Fallow Deer of Europe; it is a light, agile and graceful animal, loving to dwell in forests, and flying from the vicinity of man. It is said to have a great aversion to the rattle-snake; it destroys it by leaping into the air, and coming down upon it with its feet together, thus crushing it at a blow. It was once abundant along the whole Atlantic coast, but the incessant war waged upon it has rendered it scarce in those parts; a few still linger upon Long Island, Martha's Vineyard, and the forests near Plymouth, Mass. The flesh of this Deer is common in most of our large markets, during the winter. Of the Black-tailed Deer, we know but little.

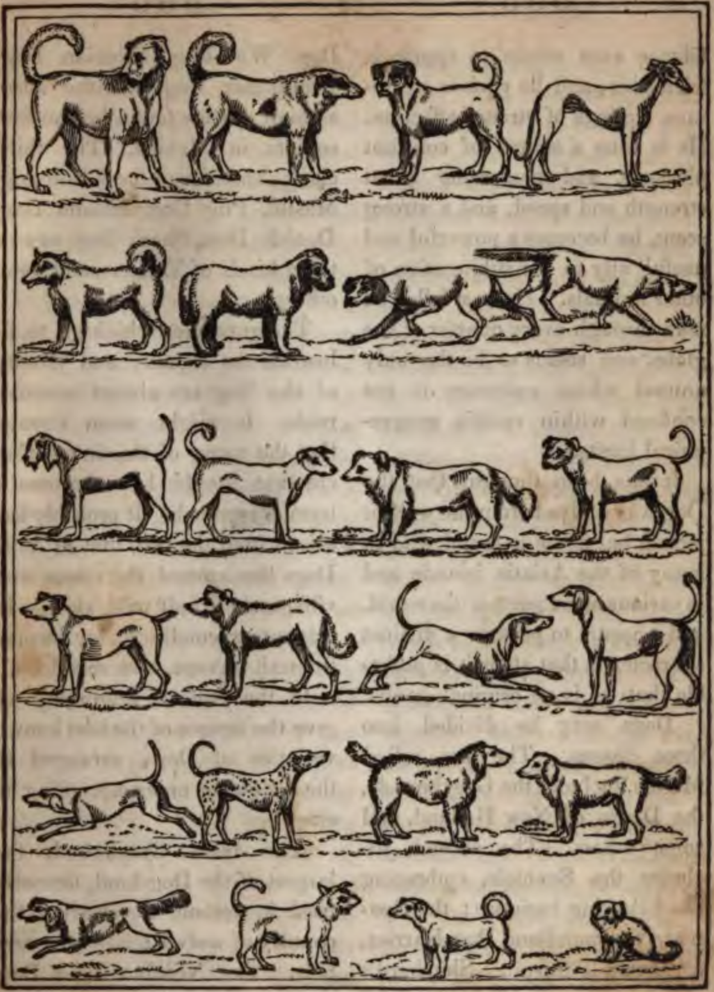
In South America there are several species of Deer, but they are not much known. On the Eastern continent there are many kinds: as the Elk, the Reindeer, the Stag or Red Deer, the Fallow Deer, the Roebuck, the Malayan Rusa Deer, the Axis Deer, and some others. The Fallow Deer is common in Europe and Asia; it is domesticated in England, and may be seen in flocks in the parks, as tame as sheep. In the domestic state they are of many colors.

DIPPER: there are several species of this singular bird. With the structure of a land bird, and incapable of diving or swimming, it nevertheless advances into the water in pursuit of its prey, walking on the bottom, completely covered up, and feeds on aquatic insects. The European Dipper is seven inches long, of a deep brown color. The American Dipper is of an ash color.

DIVER: of this genus of birds there are three species; they live always upon the water, often diving to the bottom of the deepest rivers or bays: they can hardly walk on the land, and seldom take to flight, even performing their migrations by swimming. They feed principally on fish. The Loon or Great Northern Diver is the most common, and is a general inhabitant of the northern waters, throughout the northern hemisphere. It is two feet ten inches long; and is black above, speckled with white; the under plumage is white. It is cautious and vigilant, and breeds upon lonely islands. The Black-throated Diver is twenty-six inches long; the Red-throated Diver is twenty-nine inches; these inhabit the same waters as the Loon.

DODO: a large clumsy bird, that formerly existed in Madagascar and the Mauritus, but is now said to be extinct.

DOG: the domestication of this animal is more complete than that of any other. His attachment and fidelity surpasses that of all other brutes. His con-



DOGS OF VARIOUS KINDS.

fidence even seems to approach friendship, and he excites in return feelings of strong affection. He is thus a source of constant pleasure, and possessing great strength and speed, and a strong scent, he becomes a powerful and useful ally in the subjugation of other animals. He has followed man through every quarter of the globe, and seems to be the only animal whose existence is not confined within certain geographical limits.

It has been thought that the Dog was derived from the wolf or jackal, but as he is found wild in many of the Asiatic islands and in various other parts of the world, and appears to possess a distinct character in that state, it is probable that he is an original genus.

Dogs may be divided into three classes. The first, called Matins, includes the Greyhounds, the Dingo of New Holland, and some others. The second, includes the Spaniels, embracing the following varieties: the Spaniel, Newfoundland Dog, Harrier, Pointer, Turnspit, Shepherd's Dog, Wolf-Dog, Siberian Dog, Esquimaux Dog, and the Alco, a small species found by the first settlers in Mexico. The third class embraces the Bull-dog, Mastiff, Pug Dog, Iceland Dog, Danish Dog, Shock Dog, two or three kinds of Terriers, and some others.

The anecdotes which go to illustrate the sagacity and fidelity of the Dog are almost innumerable. It might seem strange that the name of this interesting creature should have become a term of reproach. It probably has arisen from the fact, that in Asia, Dogs live around the towns and villages in a half wild state. In this outcast condition they become thievish, savage, and voracious.

In the annexed engraving we give the figures of the best known varieties of Dogs, arranged in the following order, according to size:

The Irish Greyhound, the largest of the Dog kind, formerly used in Ireland for clearing the country of wolves; it is now very rare. The Newfoundland Dog, a fine species, originally found among the natives of Newfoundland and the vicinity. It is web-footed, and fond of the water. Its sagacity and fidelity render it a great favorite. The Mastiff is an English breed, and is a favorite as a guard to houses, yards, and gardens. The Greyhound, the fleetest of all dogs, pursues game by sight and not by scent. The Esquimaux Dog, used by the Esquimaux Indians to draw their sledges ; a hardy, lively breed. The Large Rough Water Dog is web-footed, and is used in hunting ducks. The Spanish Pointer, a favorite with sportsmen in shooting birds. The Setter, a fine sporting dog used for setting up birds. The Old English Greyhound, formerly used in the chase of deer, is now become very scarce. The Ban-dog, a rare species, resembling the Mastiff. The Shepherd's Dog, a faithful animal, used by the shepherds in Europe to aid in tending their flocks. The Bull-dog, the fiercest of the Dog kind. The Cur Dog, an active, sagacious, but petulant breed. The Lurcher has rough hair, and is used for killing hares and rabbits in the night time. The Fox-hound, used in England and America for pursuing foxes. The Harrier, a strong, active and nimble dog, resembling the Beagle. The Beagle, a dog of very fine scent, with a soft, musical voice, used in pursuing hares. The Dalmatian or Coach Dog, beautifully spotted, kept as an attendant upon a coach. The Large Water Spaniel, valuable for its docility and attachment. The Small Water Spaniel resembles the larger kind. The Springer or Cocker, a lively and pleasant sporting dog, used for hunting woodcock and snipes. The Terrier : there are two kinds, the rough and smooth. They are active and strong, and are determined enemies of rats, mice, weasels, &c. The Turnspit has short, crooked legs, is bold, vigilant, and spirited, and was formerly used in England for turning a spit. The Comforter, a handsome little animal kept as a lapdog.

DOG-FISH: a spiteful and voracious shark, and a great enemy of the cod. It is known on the coast of Great Britain and the U. States, and is three feet long; brown above, and white beneath.

DOLPHIN: a fish eight or ten feet long, resembling the porpoise: it is black above, fading to white beneath. Its jaws are furnished with many teeth. It inhabits the European and American seas. Its appearance with the porpoise, sporting on the water, is held to portend an approaching storm. The ancients entertained many fanciful notions of this fish, and Pliny tells a story of one that daily carried a boy to school across an arm of the sea. There are a dozen other species of Dolphin besides this we have described; and there is a small fish called Dolphin by the sailors, but which is more properly called the Pilot-fish.

DORADO: a beautiful but voracious fish, six feet long, and inhabiting tropical waters. It is ever in motion, and may be often seen playing with great velocity around ships.

DORMOUSE: a genus of quadrupeds of which there are four species. The Common Dormouse inhabits Europe; it lives in the woods, feeds upon corn and nuts, and in cold weather becomes torpid, rolling itself up in a ball. In this state it remains till the return of spring. The other species have the same habit of sleeping during the winter.

DOTTEREL: a species of plover, ten inches long, common in Europe, and esteemed rather a foolish bird.

DOVE: see Pigeon.

DRAGON: the Flying Dragon, notwithstanding its name, is a harmless little lizard, ten inches long, inhabiting trees and feeding on insects. It is found in Asia and Africa, and appears to be divided into several species.

DUCK: the birds belonging to this tribe are extremely numerous, differing from the geese in having the bill broader at its base than it is high, and in having their legs shorter and placed farther back. They walk on the land with a waddling gait; their home seems to be upon the water. Their flight is light, swift, high and whistling; they often fly at night. They approach the seacoast in autumn and winter, and frequent fresh-water ponds, lakes and rivers at other times. They feed upon vegetables, plants, and aquatic animals.

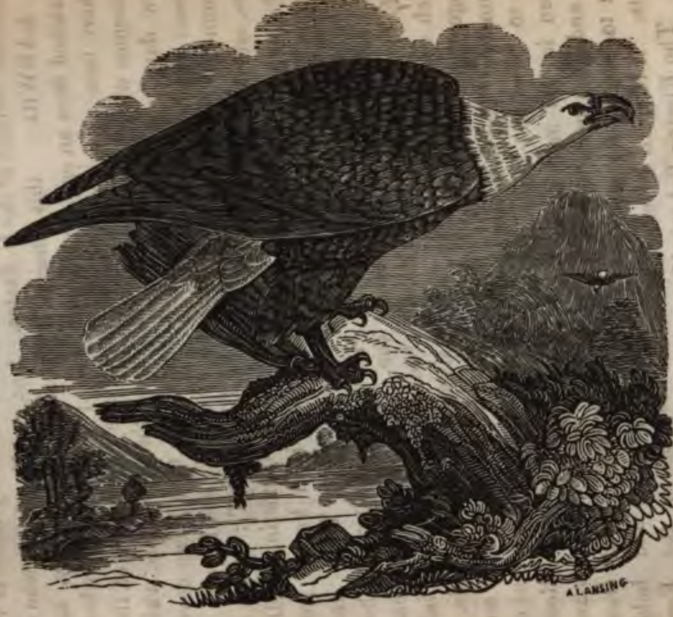
The Common Duck or Mallard is the origin of the domestic Duck. The Shoveller is remarkable for the broadness of its bill. The Gadwall or Gray Duck associates with the Mallard. The Pintail or Winter Duck is an elegant species, much esteemed for its fine flavor. The American Widgeon or Baldpate resembles the European Widgeon, associating with the Canvass-back, and often snatching away a root that has been pulled up by the latter. The Dusky Duck is a numerous species, resembling the Mallard. The Summer or Wood Duck is the most beautiful of the genus, and makes its nest in the hollow of some decayed tree. The Blue-winged Teal is much esteemed for the table. The Great-winged Teal is a companion of the Mallard. The Musk or Muscovy Duck exhales a strong odor of musk.

The preceding species have no membrane attached to the thumb or short toe; the following, which are called sea-ducks, have such a membrane, which enables them to swim and dive with greater facility. They migrate in large flocks and frequent deep waters, often plunging to great depths both for food and amusement. The Eider Duck is remarkable for the softness of its down. The King Duck is nearly allied to the preceding. The Black or Surf Duck is a great diver, and is not much valued for food. It is sometimes called the Sea Coot. The Velvet Duck is sometimes called the White-winged Coot. The Scoter Duck much resembles the preceding. The Ruddy Duck is sold in the Boston markets under the name of Dunbird, and is much valued for the table. The Pied Duck frequents sand-bars, and is sometimes called the Sand-shoal Duck. The Canvass-back Duck is well known as a great delicacy for the table; its flavor is supposed to be given by its feeding upon eel-grass. The Pochard associates with and resembles the preceding. The Swamp Duck is usually called the Blue-Bill. The Ring-necked Duck is tender and well-flavored. The Golden-Eye is called the Spirit Duck by the Indians, and the Brass-eyed Whistler by our gunners. The Harlequin Duck is called the Lord by the fishermen of Newfoundland, on account of the beauty of its colors and markings. The Long-tailed Duck has down upon the breast as soft as that of the Eider Duck.

All the preceding species, and two or three others, frequent the American waters; with the exception of the American Widgeon, Dusky Duck, Wood Duck, Blue-winged Teal, Musk Duck, Surf Duck, Ruddy Duck, Pied Duck, Canvass-back and Ring-necked Duck, they are all known in Europe. There are also some foreign species not here enumerated.

E.

EAGLE: this genus of birds are the most powerful of all the feathered race. They pursue their prey with rapid flight, seizing it in their talons, and tearing it to pieces. The larger kinds bear off quadrupeds, birds, and reptiles. Their sight is keen, but their sense of smell is imperfect. They generally inhabit mountainous districts. There are many species of Eagle. The principal are the Imperial Eagle, of the Eastern continent, the Golden or Ring-tailed Eagle, of both continents, the White-headed or Bald Eagle, of both continents, the Washington Eagle of America, and the Sea Eagle, found in Europe. Besides these, there are many others in different parts of the world, all possessing the general characteristics of strength



WHITE HEADED, OR BALD EAGLE.

and rapacity. The Osprey or Fish Hawk appears to be closely allied to this genus. The Bald Eagle has been adopted as the national emblem of the U. States.

EARWIG: this insect is hatched from an egg, and lives a short time as a worm. It then becomes winged, and lives but a few days. The idea that this insect enters the ear is wholly groundless. It is perfectly harmless, and does no injury except in the garden, where it lives among flowers and destroys many of them.

EEL: there are several species of Eel; the most remarkable of which are the Conger Eel, (see Conger), and the Electric Eel, or Gymnotus. The Common Eel is two to three feet long. It lies hidden in the mud during the day, and goes upon the land at night to search for worms and insects. It is much esteemed as food. The Electric Eel inhabits streams and rivers in S. America. It is about five feet long, and of different colors. The shocks given by these fishes are so severe as to deprive animals of life that are exposed to a repetition of them. The pain and numbness occasioned by them is very violent, and Humboldt, who received a shock in this way, says that the pain lasted a whole day. All the inhabitants of the water dread the Gymnotus, which kills more fish than it can devour.

EGRET: see Heron.

ELEPHANT: this is the largest of all existing quadrupeds, and has been known from the earliest ages. There are two species, the Asiatic and the African. The former is generally about ten feet long, and inhabits Asia and the Asiatic islands. The latter is not so large, and is thought to be the Elephant of the ancient Greeks and Romans. The common color of this animal is an ash gray. White ones are extremely scarce, and held in much esteem by the Eastern sovereigns. They are sometimes found of a reddish color. The eyes of these animals are very small, but sensible and lively, having at times a sentimental

AN ELEPHANT PULLING UP A TREE, FOR FOOD.

and pathetic expression. The Elephant has quick hearing and an exquisite smell, sometimes selecting flowers with his trunk, and smelling them with great eagerness. His ordinary food consists of herbage, roots, leaves, and the tender branches of trees, which he breaks off with his trunk. He will sometimes tear large trees out of the ground to feed upon their long juicy roots. He inhabits forests in the neighborhood of rivers, and swims with great ease. He is a gregarious animal, and is generally found in large herds. He is very strong, and is capable of carrying two thousand pounds' weight.

The trunk or proboscis is the organ to which this animal owes its celebrity; without it, owing to his clumsy form and ungainly limbs, he would be in a most helpless condition. This trunk answers all the purpose of a hand; it is at once so powerful, delicate, and flexible, that with it the animal can pick up a pin, as well as lift a man to a height above his head. With it he also conveys food and drink to his mouth. His tusks, which are a great article of commerce, are situated on each side of the upper jaw, and are used as weapons of defence. His extreme docility makes him easily tamed, and numerous accounts are given of his sagacity when domesticated. We might almost suppose that he possessed the faculty of reasoning. He is also susceptible of gratitude, capable of strong attachment, and serves his master with zeal, intelligence and fidelity, sometimes beyond his capacity. An instance of this once took place in India, where these animals were employed in launching ships. A particular Elephant was ordered to force a large vessel into the water; the work proved too much for his strength, though he made great efforts. These, however, his keeper affected to despise. "Take away that lazy beast," said he, "and bring another, better fitted for service." The poor animal instantly redoubled his efforts, but fractured his skull, and died upon the spot.

The hunting of Elephants forms a princely sport among the inhabitants of Asia, and in Africa they are pursued for their flesh, tusks, and teeth. In India, the principal method of taking the wild Elephant is by means of tame female Elephants. The huntsmen, each mounted on one of these decoy-animals, proceed till they come in sight of a wild Elephant, and then dismounting, the females, who are trained for the purpose, engage the attention of the wild Elephant. The huntsmen now cautiously advance, and, assisted by the decoys, tie the legs of their captive with strong cords, if possible to the trunk of a large tree. Here they leave him till his rage is exhausted, and afterwards bring him to submission by hunger and caresses. He is then unbound, and taken home by his female companions.

The following anecdote will show how willingly these decoys perform their part. A female Elephant, which had been purchased by a gentleman who was ignorant of the service on which she had been previously employed, contrived to escape from the care of her driver, and was missing for about a week. At the end of that time, she made her appearance, and being secured, was accoutred, and her master went on her to take a ride. He happened to proceed towards the skirts of a very heavy grass jungle, into which she frequently attempted to turn, but was as often prevented by her driver. At length, she became quite restive, and, in defiance of all control, rushed into the jungle; nor did she stop, until, arriving at a thick patch of trees, to the utter astonishment of her terrified master, a large male Elephant was discovered, round whose fore legs she had twined the chain with which she was ordinarily fastened in the night.

To give an idea of the labor which the domesticated Elephant performs in India, it may suffice to state that all the casks, sacks and bales are carried by Elephants. They take burdens on their backs, their necks, and their tusks; they put packages into boats without wetting them, arranging them carefully, so that they may not roll; they are employed in carrying people and burdens in the march of an army, in field-sports, in processions and ceremonials. In battle these animals show great regard for human life, and, except when wounded, never place their foot upon the disabled and dying men who lie in their path, frequently taking them up with their trunks and removing them to a place of safety.

ELK: this animal, the largest of the deer kind, is common to the northern parts of the Eastern continent, and so closely resembles the Moose of our country, as to make it a matter of doubt whether they are the same species or not. The Elk is taller than a horse, with palmated horns; he is hunted in Europe nearly in the same manner as the stag; that is, with dogs and horses. The American Elk is a very different animal, and is described under Wapiti.

EMEU: this bird, of the ostrich family, is nearly six feet long. The body is hairy, of a mixed brown and gray color, paler on the under parts; the head, neck and wings are feathered. It is peculiar to New Holland, and subsists upon vegetables and fruits. It runs with great swiftness and is very wild. It is hunted for its flesh, which is said to have much of the flavor of beef.

EPHEMERA: of this insect there are various kinds. They are produced from eggs in the form of worms, whence they change into aurelias, a kind of middle state, and lastly turn into a beautiful fly, resembling a butterfly; their wings, however, are perfectly transparent, without the covering of dust that makes that insect so gay. This creature disports in the sun an hour or two, and then dies.

ERMINE, or Stoat: this animal is supposed to be the common weasel, called Ermine in its white dress, and bearing the name of Stoat when it is red or yellowish. Numbers of them are found in old forests and wooded grounds.

FALCO: to this family belong the Falcons, Eagles, Hawks, Kites, Buzzards, and Harriers. They are all birds of prey, which they seize and carry off in their talons. They are not gregarious, but live in pairs. They rise to a great height in the air, and their sight is very acute. Their plumage varies at different seasons.

FALCON: there are many species of this bird. They all feed on living animals, and show much address in surprising and seizing their prey. They nestle in the crevices of rocks. Almost all of them may be employed with success in hawking. The Jer-Falcon is white, marked with brown bands. It is about two feet long. It is found in the cold northern regions of both continents. Next to the eagle, this bird is the most formidable, active and intrepid, and was anciently held in the highest esteem for falconry. The Common Wandering or Peregrine Falcon is common both in Europe and America, being known in this country as the Duck Hawk. or Big-footed Hawk. It is of a brownish black color, and is about sixteen inches long. It is very strong and fierce, and attacks large birds, and carries them away. It was formerly in great esteem in falconry, and bore the name of Tercel Gentil. The Lanner, Merlin, Hobby, Kestril, and some others, are small European species, preying upon birds, mice and frogs.

FENNEC: this pretty little creature is found in Nubia, and is supposed to be a species of dog. It is so small that one of them might be put into a pint mug.

FERRET: this little animal, of the weasel tribe, is about fourteen inches long, of a yellowish color. It is thought by Cuvier to be a variety of the polecat. It is a great and natural enemy of the rabbit.

FIELDFARE: a species of

thrush common in Europe, about ten inches in length.

FINCH: a genus of birds which includes a great variety of species, passing under the names of Finches, Sparrows, Grosbeaks, and Linnets. These differ in many respects, yet are allied by many common qualities, which seem to pass insensibly into each other. They are spread over the whole world; live in woods, thickets, and gardens; assemble in flocks, feed on seeds, and contribute more than any other class of birds, by their familiarity, sweet songs and lively manners, to cheer and enliven the landscape. They are easily domesticated. Among the proper Finches, the following are the most interesting to us; the Indigo Bird, the Painted Bunting, and the Yellow-bird, which are American species; the Canary Bird, the Chaffinch, and Goldfinch, which are among the foreign species.

FISHER, or Pekan: an animal resembling the marten, but larger and stronger. It inhabits the northern part of the United States and Canada. The fur is yellowish, tipped with black, and is much esteemed.

FISHES, are extremely numerous in species, and many of them are but little known. They are found in every ocean, sea, lake or river—under the dreary skies of the poles, and the burning latitudes of the tropics. In every part of the globe, they furnish a supply of nutritious food, at no other cost than the labor of taking them, requiring no pasture and no shepherd. Dr. Franklin says, "he who takes a fish out of the water finds a piece of money." Beside food, they supply us with oil, isinglass, spermaceti, ambergris and other things. Like birds, most of them migrate from place to place, but the distance from which they come is probably exaggerated.

Fishes are chiefly produced from eggs or spawn in immense numbers. A Cod produces nine millions of eggs in a season; the Flounder a million, and the Mackerel half a million. These are laid in shallow water, and become attached by their glutinous covering to stones, sticks, and rocks. Most of them are devoured by the greedy citizens of the wave.

Fishes not only furnish the table, but afford employment to a great many men, women and children. The form of a fish enables it to move in every direction with ease and rapidity. It directs its course by means of its fins, which are placed on different parts of the body. It breathes through the gills, which are placed on each side of the head, and answer the purpose of lungs. The body is generally covered with scales, though sometimes with thick plates, spines, or tubercles. The age of fishes is a matter of doubt, though it is thought that they live long lives. Beside the fishes which we have here described, there are others of finer organs and higher sensations, having all the tenderness of birds and quadrupeds for their young. Such are those of the cetaceous order, including the Whale, Cachelot, Grampus, Dolphin, and Porpoise. These are not hatched, but are brought forth alive; they have warm blood like quadrupeds, while the blood of other fishes is cold; they breathe the air, coming up every few minutes for this purpose.

It is supposed that the kinds of fishes in the world amount to one thousand; and three hundred of these kinds probably exist in the seas, rivers, and lakes of our country. It is a curious fact, that some sea-fishes, as the Basse, Herring, &c., are found in the great western lakes; this might lead to the conclusion that there has been at the deluge, or at some other period, a mode of communication, not now existing, between the ocean and these inland waters.

FLAMINGO: of this bird there are two species, one found in America, and the other in the Eastern continent. The body is small, the neck and legs slender. It is about four feet long. It is of a rose color, excepting the wings, which are a brilliant red. A flock of these birds seen at a little distance appear like a file of soldiers. They are web-footed, and feed on fish. The ancient Romans esteemed the tongue of the Flamingo as a great delicacy.

FLEA: this well-known insect has a small head, two feelers, and a trunk, with which it sucks the blood of man and animals. It has six legs, which fold up one within another. When it jumps, these legs all spring out at once, and the body is thrown two hundred times its own diameter. If a horse could leap in proportion to his bulk as the flea does, he would go from Boston to New Orleans at a single bound.

FLOUNDER: this fish, belonging to the same family as the plaise, dab, halibut, turbot, and sole, is distinguished by having both eyes on one side of the head. Its form is an irregular oval. One side is flat; the other, representing the back, is somewhat rounded. It keeps near the bottom and often hides in the mud. It is common to European and American coasts, and is esteemed good food.

FLY: a well-known insect, of which there are many genera and species, having transparent wings, and a body divided into three parts; the head, the corslet, and the belly. Some have four wings, as the Bee and Wasp; some have but two, as the Horsefly, Bluebottle, &c. They are all produced from eggs, being first hatched into worms, then passing into the chrysalis state, and finally into winged insects. Some Flies live but a few hours, some for a few days, some for a season, and some for two or three seasons.

FLY-CATCHER: a genus of birds, of which there are many species, both foreign and domestic. They subsist in the summer upon flies, moths, and winged insects, which they catch upon the wing. In the fall, they feed upon berries. They are usually petulant, courageous and tyrannical, driving the most powerful birds of prey away from the vicinity of their nests. The most remarkable species among us are the Tyrant Fly-catcher or Kingbird, the Pewee or Phœbe, and the Wood Pewee.

FLYING-FISH: this curious creature is about the size of a herring, and inhabits the warmer parts of the Atlantic ocean, and the Mediterranean. Its great enemy is the dorado, which, pursuing it eagerly in the water, induces the little fish to shoot into the air, where it flies by means of two strong fins to a considerable distance. Though it escape from its pursuer in the wave, the tropic-bird and the albatross often seize it in the air. Sometimes it alights upon a vessel in shoals.

FOSSAN: an animal found in Africa and Madagascar, resembling the genet.

FOSSIL ANIMALS. Geologists, in searching into the structure of the earth, have discovered the remains of many animals, which are unknown in a living state. In the caverns of Germany, fossil bears have been found, larger than any now in existence, and with a head resembling that of the hippopotamus. Fossil wolves, foxes, gluttons, weasels, rabbits, and rats, have been found, nearly resembling the present species. The Megatherium appears to have been as large as an ox, and resembling the sloth. The bones were found in South America. Mammoth bones, resembling those of the elephant, have been found in various parts of the earth. The bones of the great Mastodon, an animal resembling the elephant, but much larger, have been found in the U. States. One entire specimen is preserved in Peale's museum at Philadelphia. Several kinds of fossil Reptiles have been discovered. The Ichthyosaurus was a species of lizard, but with ribs and paddles like a fish. Its length was twenty-five feet. The Plesiosaurus had the head of a lizard and the neck of a serpent, with paddles like a whale. Its length was sixty or seventy feet. It would appear from these facts, that whole races of animals, some of monstrous size and extraordinary endowments, must have existed on the earth, which have now disappeared, only leaving their bones to give testimony to their existence. This subject opens a field of interesting inquiry, which has been pursued with great industry and wonderful results by the late Baron Cuvier.

FOX: animals of this genus are very widely distributed, and are found in all the temperate and northern regions of both continents. They prey by night, and notwithstanding the persecution they suffer, their extreme cunning enables them to preserve their race. They are very distrustful, and not easily deceived by snares that may be laid for them. They prey upon rabbits, birds, and other small animals, and sometimes venture near the farm-yard, carry off the poultry, and suck the eggs. The voice of the Fox is very various; he yelps, barks, and expresses discontent, sorrow, or pain, by different tones. His bite is dangerous, and he will not easily forego his hold. There are a great many varieties of this quadruped, owing to the influence of climate. The principal species are the Arctic Fox, inhabiting the Arctic regions of both continents, Common Red Fox of both continents, the American Red Fox, Silver Fox of America and Asia, Gray Fox, Cross Fox, and Kit Fox of North America. The skins of the Silver, Kit, Cross, and Red Foxes, are annually imported from Hudson's Bay in great numbers. That of the Silver Fox is six times more valuable than any fur produced in North America. It is black, tipped with silvery white.

FROG: this tribe of animals is too well known to require particular description. They are produced from an egg, and make their first appearance as Tadpoles. In this extraordinary state they remain a short time, and then by another process become Frogs. The number of eggs laid by one of these reptiles amounts to as many as twelve hundred a year; and were it not for the variety of enemies that they have, they would multiply to a fearful extent. In former times, when France was for the most part covered with forests, the retainers in the vicinity of the chateaus were obliged early in the morning in summer to disturb the pools with sticks, that the uninterrupted croaking of these noisy reptiles might not disturb the slumber of their masters. In winter they retire into the mud, and remain dormant during the cold season.

The Green or Edible Frog is found in abundance in the greater part of Europe. It is of a beautiful green color, and is about three inches in length. Its hind legs are considered a great delicacy by the epicures of the old continent. In Germany, nearly the whole of the Frog is eaten. The Bull-Frog is found in North America. (See Bull-Frog.) The Tree Frog is more slender than the rest of the tribe. It is of a green color, found in Europe and America. In summer it resides principally upon the branches of trees, feeding on insects. It frequently suspends itself from a branch by one of its hind legs. It is very active, and can leap to a considerable distance. It is commonly called Tree Toad, in this country.

FROG-FISH, Sea-Devil, Mouse-fish, Bellows Head, or Angler: this fish is from two to six feet long, with a very large head, wide mouth, and a body of a brown color. It resembles a tadpole in form. It frequents deep, dark, muddy places, and lies in ambush for its prey, waving the rays upon its head, which are taken for worms by the smaller fish. It is found on the European and American coasts.

FULMAR: see Petrel.

G.

GADFLY: there are various species of this insect, infesting different animals. It bores a hole into the skin for the reception of its eggs. When the grub is hatched, it feeds upon the wounded spot made by its parent. The

Ox, Sheep, Reindeer, and Horse Gadflies, torment these animals, and sometimes prove fatal to them.

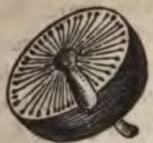
GALL INSECTS: these are bred in an excrescence of a kind of Asiatic oak, and formed by a kind of fly, which bores into the bark of the tree, for a place in which to deposit its eggs. The sap of the tree hardens round the eggs, grows with the growth of the tree, and becomes what we call the gallnut. The worm that is hatched within this spacious vault, lives upon the substance of the ball till after its change into chrysalis and fly, and then it eats its way through into the air.

GALLINULE: a genus of birds resembling the Rails. They swim with ease and run with speed on the land. They feed on insects and vegetables. There are several species, the Land Rail, or Corn-Crake, Spotted Water Hen, or Rail, Dwarf Rail, Water Hen of Europe, and the Purple and Florida Gallinules of America. The latter strongly resembles the European Water Hen.

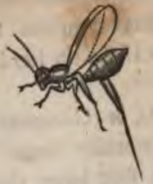
GANNET, or Soland Goose: this species is chiefly found in the northern regions of both continents. It is white, marked somewhat with black, and is about two feet six inches long. It dwells in desert and rocky islands in the sea, in incredible numbers. It is unable to dive, walks with difficulty, and seldom swims. It hovers over the water for its prey. There is a rock called Gannet Rock in the bay of the St. Lawrence, which it frequents in vast multitudes, appearing at a distance like masses of snow. This is the bird whose eggs afford the inhabitants of St. Kilda their chief support. In the Hebrides, immense numbers are also taken.

GAR-FISH: this fish is about two feet long, of a blue green color above, and silvery below. It is found in European and American seas. It is much esteemed for food, notwithstanding the prejudice excited in many by the green color the bones assume when it is dressed.

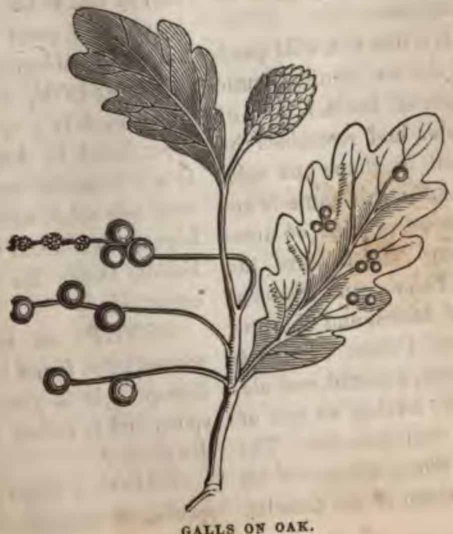
GAUR: an animal of the ox kind, being six feet high at the



GALL, MAGNIFIED.



GALL INSECT, MUCH MAGNIFIED.



GALLS ON OAK.

shoulders, and twelve feet long. It is the largest of the tribe; it is found in India, in herds of ten or twelve.

GAVIAL, or Gangetic Crocodile, is generally from twelve to eighteen feet long, though it sometimes attains the size of thirty feet. It inhabits India and the borders of the Ganges, where it commits great havoc among the natives who come to bathe in its waters. The hunting of this monster is a favorite sport in the island of Ceylon.

GAYAL: this is a wild quadruped of the ox family, found in the forests of India. It is of a brown color, and resembles the common bull in shape and size.

GAZELLE: this name is applied to several species of antelope, among which are the Springbok, Pallah, and Senegal Antelope, of Africa, and the proper Gazelle of Persia. This latter is a slender, graceful, and elegant creature, having an eye of great depth and softness. The Persian poet likens the eyes of his mistress to those of the Gazelle.

GECKO: a disagreeable and stupid lizard, found in the warm parts of both continents. There are several species; they are covered with scales, and are generally about a foot long. Their feet are so constructed as to enable them to walk on perpendicular surfaces, and even ceilings. They are nocturnal animals, and seldom move out in the day. One species, called the House Gecko, frequents houses in Egypt and India, and causes the inhabitants great alarm from its supposed poisonous qualities.

GEMSBOK, or Pasan: this quadruped is a species of antelope, found in Asia and Africa. It is a beautiful animal, of a reddish ash color, with long pointed horns. It is about the size of the Fallow Deer. Its flesh is much esteemed.

GENET: an animal of the weasel tribe, found in the south of Europe. It is gray, with black spots, and is rather smaller than the marten.

GIBBON: there are several species of this ape, the principal of which are the Gibbon, Active Gibbon, and Siamang. They are natives of the E. Indies, Sumatra and the Molluccas.

GILT-HEAD: this fish is fifteen inches long, of a bluish color, with a silvery head, spotted with gold and purple. It is not now much thought of, but was formerly held in great esteem by the Greeks and Romans for the table. The Greeks consecrated it to Venus.

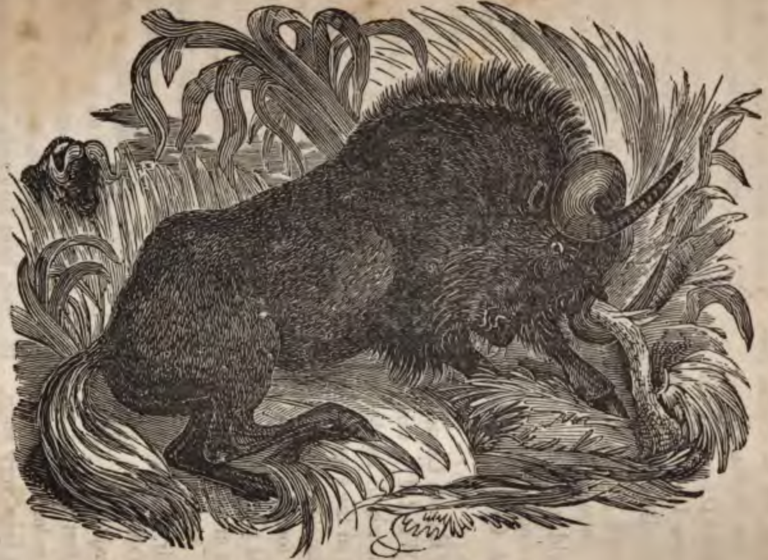
GIRAFFE: see Cameleopard.

GLOW-WORM: this is a small worm, which sends forth a bright light in the evening. The male and female are entirely different; the former being a beetle and flying at pleasure, the latter being only a creeping insect; but still it has been celebrated by poets in their descriptive songs.

GLUTTON: this quadruped, called Carcajou in Canada, is about three feet long, of a blackish brown color. Its body is thick and its legs very short. It is possessed of prodigious strength for its size. It closely resembles the Wolverene, and is supposed to be a variety of that animal. It is found in the northern parts of Europe and America, and is considered a species of bear by some naturalists.

GNAT: an insect with long legs, two wings and a slender body. It has a trunk which it buries in the flesh of animals, and sucks their blood. In hot climates, where there is stagnant water, they are innumerable. Some of them are six inches long, and some are so small as to be scarcely visible to the naked eye. They are first hatched into worms from eggs, then pass into the chrysalis state, and finally take wing. There are some insects resembling gnats, that are destitute of the trunk, and do not suck the blood; these are called Tipula.

GNU, or Gnoo: an antelope five feet and a half long, of a brown color, with an erect mane, and long hair upon the tail. It has strong horns, flattened at the root, bent forwards, and turning up into a pointed hook. Its body resembles that of a horse. It is a fleet and fierce animal, found



THE GNOO.

in Southern Africa. When travellers meet with a herd, they sometimes hoist a red handkerchief, which excites these creatures in such a manner that they come prancing about, and then fly away at a rapid bound.

GOAT: of this animal there are many species, and these are divided into a multitude of varieties. The principal species are the Ibex of the Alps and Pyrenees, Abyssinian Ibex, Goat of Persia, from which the domestic Goat is bred, the Jemlah Goat of the Himlayah mountains, and the Rocky-mountain Goat, resembling the domestic Goat. This race of animals seem to be a link between the sheep and antelope. They are hardy, vagrant creatures, loving to rove amid rocks and precipices, and are often seen climbing and sleeping in security on the dizzy edges of crags and cliffs. In foreign countries, the Goat is used by the poor in lieu of the cow, for milk. The ease with which it is kept, renders it very useful. Among the domestic varieties of the Goat the Angora breed is celebrated for its long, soft, white hair, used for various manufactures; the Cashmere breed for its long, silky hair, of which cashmere shawls are made; and the Thibet breed, for its fine hair of various colors, for manufactures.

GOAT-SUCKER: a genus of solitary birds, preying on insects by night, with wide mouths and large ears and eyes, like those of the owl. Their name is derived from the erroneous notion that they are accustomed to suck the milk of the goat. The most remarkable species are the Night Hawk, Whip-poor-will, and Chuck-will's-widow, of America, and the Night Jar, or Fern Owl, of Europe.

GODWIT: a genus of tall birds, allied to the curlews, with long bills, living in marshes, and feeding on worms and the larvæ of insects. They migrate in flocks by night, particularly by moonlight. There are four species, two American and two foreign. The Great Marbled Godwit is nineteen inches long; the

Hudsonian Godwit is sixteen inches long. These two are American species.

GOLDFINCH: the American bird of this name is of a rich lemon color, with black upon the wings and tail. It is about five inches long. It feeds upon seeds, and is generally known by the name of Yellow-bird. The European Goldfinch is brown, with crimson on the head, black and white wings, and lower parts white. In other respects it resembles the American Goldfinch.

GOLD-FISH, or Golden Carp, is a native of China, and is now domesticated in almost every country, in rivers and ponds.

GOOSANDER: this bird is of the Merganser genus, and closely resembles a duck, swimming with the body beneath the water and the head only exposed. It is about two feet two inches long, of a deep black above and yellowish below.

GOOSE: this bird, with the ducks and swans, is arranged by naturalists under a genus called **Anas**. The Goose tribe in a wild state are vigilant and keen-sighted, flying in flocks arranged in long converging lines, led by one of the number. They swim but little, sit deep in the water, and feed on vegetables, fish, and reptiles. The species are numerous, and spread all over the world. The Wild Goose is the original stock of the common tame Goose. The other species are the Snow Goose, the Laughing Goose, Bean Goose, Barnacle Goose, and Brent Goose, all inhabiting both continents. In Lincolnshire, England, multitudes of geese are raised; one person there often having as many as a thousand breeders. They are stripped twice a year for their feathers, and five times a year for their quills. The Goose lives to the age of eighty or a hundred years.

GOPHER, or Camas Rat: a species of mole found on the Missouri and Columbia river. It has cheek pouches, in which it is thought to bring up dirt when digging its hole; it has broad feet, and works with prodigious energy. It feeds upon the camas root, from which it gets its name.

GOSHAWK: this bird is of the falcon tribe. There are two species, one European and one American, closely resembling each other, being both about two feet long, and having the same habits. They were formerly much esteemed in falconry, and were used for the larger game.

GRAKLE: a general term, including the following American Blackbirds: the Great Crow Blackbird, Crow Blackbird, or Purple Grakle, Slender-billed Blackbird, and Rusty Blackbird.

GRAMPUS: this cetaceous fish is about twenty-four feet long. It is exceedingly voracious, and devours fish in great numbers, not always sparing its own kind. It displays great solicitude and affection for its young. It is found in deep waters.

GRASSHOPPER: of this insect there are endless varieties. They are hatched from eggs deposited in holes in the earth, and live as worms for many days, when, by the same laborious and slow process that many other insects go through, they burst their outer skin, and come out with wings to swarm in the meadows and enliven the landscape. The Grasshopper generally chirps during the summer, particularly at sunset. It feeds upon grass.

GRAYLING: this is a river fish, found in the mountainous parts of Europe. It is about eighteen inches long.

GREBE: this genus of birds frequent both salt and fresh waters, swimming as well beneath as above the surface. They dive for a great length of time, and descend so far as sometimes to be caught in the deep sea nets. Indeed they travel, dwell, sleep, and migrate in the water, and they have been emphatically called Water Witches. They make their nests in the reeds, of dry grass, and line them with down, from their own breasts. The Crested Grebe or Gaunt is about twenty inches long, of a blackish brown color; the Red-necked Grebe is about seventeen inches long; the Dusky or Horned Grebe is about twelve inches long; the Eared Grebe about eleven inches long, and the Little or Black-chin Grebe about eight inches long. All these, except the Eared Grebe, are found in the colder parts of both continents. The latter, it is thought, will probably be found in America.

GREENFINCH, or Linnet: a fine species of Finch, about six inches and a half long. It is of a yellowish green color, and is found in Europe.

GREYHOUND: of this dog there are several varieties; the Common Greyhound, Irish Greyhound, Scottish Greyhound, Italian Greyhound, Turkish Greyhound, and Russian Greyhound. The Common Greyhound is used in coursing for hares; his form being very slender, and his legs long, enable him to run with prodigious speed. The Italian Greyhound is greatly admired for the elegance of his form; the Russian Greyhound has long, thick hair; the Turkish Greyhound has the skin nearly naked; the Scottish, has the hair slightly curled and wiry. These animals are less attached to their masters, and have less intelligence, than the Spaniels.

GROSBEAK: a sub-genus of birds, belonging to the finch kind, including several species. The bill is short and stout, from which the name is derived. The Cardinal Grosbeak, or Red-bird, is a splendid American bird, with a crest on his head. He is a great singer, and is sometimes called the Virginia nightingale. He is common in the warmer parts of the U. States. The Evening Grosbeak, the Red-breasted, and Blue Grosbeaks, are the other American species. The Pine Grosbeak is considered a Bullfinch; it inhabits the northern parts of both continents, and feeds on pine seeds.

GROUSE: this genus of birds inhabits large forests, generally in mountainous countries, though some of them prefer plains. They are very shy and wild, subsisting on berries, buds, and leaves. Their voice is sonorous; their flesh is considered superior to any other. The principal species are the Black Cock, and Cock of the Woods, of Europe, the Ruffed Grouse, Pinnated Grouse, Spotted Grouse, and Sharp-tailed Grouse of America, and the White Grouse and Willow Grouse of both continents. The Ruffed Grouse is called partridge in New England and pheasant at the South. It is abundant in all parts of the country. The Pinnated Grouse or Heath-hen is found on some of the larger islands, in Massachusetts, on Long Island, in New Jersey, and the Western states. The White Grouse or Ptarmigan is found in Europe, as far south as Scotland and Wales, but in America it is confined to the Arctic regions. The Cock of the Woods is the largest of the species, being two feet ten inches long. It is found only in the northern parts of the Eastern continent.

GUANACO: see Lama.

GUDGEON: this fish is from four to six inches long, of a pale olive color, spotted with black. It is generally found in gentle streams and lakes in Europe, particularly in Germany, where it is extremely plentiful.

GUILLEMOT: there are five species of this genus of birds, all of them inhabiting the northern regions of both continents; the Black Guillemot, Marbled Guillemot, Foolish Guillemot, Large-billed Guillemot, and Little Auk or Sea Dove. They have the same habits, living on desert and precipitous islands and rocks near the sea, swarming like bees, and making a most discordant noise. They hatch their young upon the bare rock. They feed wholly upon fish, after which they swim and dive in an unequalled manner. Some of the species are not yet well known.

GUINEA-HEN, or Pintado, is a native of Africa and the neighboring islands, but it is now domesticated in Europe and America. It is of a grayish blue color, sprinkled with small white spots. The head and upper part

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of the neck are naked. It resembles the pheasant and the turkey. In its native country it is seen in large flocks, feeding its young, and leading them in quest of food. Its voice is very harsh and disagreeable.

GUINEA-PIG: this creature, though a native of Guinea and Brazil, may be bred in temperate and even cold countries. It is smaller than the rabbit, and of different colors. It has no tail, and is very restless. It feeds on all sorts of nuts, apples, and fruits. It whines like a young pig, and employs most of its time in cleaning and smoothing its fur. Its skin is of little value and its flesh is tasteless.

GULLS: birds of this genus are diffused over every coast, and the species are very numerous. Flocks of them haunt the shore in pursuit of living or dead fish, which they devour with the utmost greediness. They are noisy, gluttonous, quarrelsome, and cowardly, often attacking each other without apparent cause. They keep much upon the wing, flying with rapidity for a great length of time, even in strong gales of wind. They have a loud, shrill, and harsh voice, their cries being often repeated while flying. The principal Gulls are the Black-headed and the Black-backed Gulls. The former are also called Laughing Gulls, from their cry of *ha*, *ha*, *ha*, *haw*, resembling a broad laugh. Sometimes, while fishing and plunging into the water for their prey, they burst out very oddly into *oh*, *oh*, *agh*, or a hoarse screaming laugh. They are very familiar, and attend upon the track of the fishermen for the refuse fish. When they migrate, they assemble in vast numbers, and rise spirally into the air, chattering in concert, and then all move off in a line to the south. They are found in both continents. The Black-backed Gull, or Saddle-back, is a great tyrant among the sea-fowl, and has no mercy upon any object that may allay the cravings of its insatiable hunger. It watches the bait of the fisherman, pounces upon the Eider Duck and its young, plunges under water for crabs and lobsters, catches moles, rats, and hares, and often chases the Willow Grouse, and devours her eggs and young. This insatiable species is found in both continents. The more common kinds may be seen at all times along our coasts and harbors.

GURNARD: there are several species of this fish, inhabiting European seas; the principal are the Gray Gurnard, Cuckoo Gurnard, and Lineated Gurnard. They are all from one to two feet long, and are esteemed good food. The Web-fingered Gurnard is an ugly fish, with a coat of mail on his head. He is found near New York.

GWINIAD: this fish inhabits the Alpine lakes of Europe. The Broad Gwiniad, another species, inhabits the rivers of Germany and Sweden. They are both a foot long, of a bluish gray color.

GYMNOTUS: see Electric Eel.

H.

HADDOCK: this fish is from one to two feet long, of a dusky brown color above, and silvery beneath. It resembles the cod, is excellent eating, and is common in Europe and America.

HAKE: a fish sold at Cape Cod under the name of Stock-fish. It is from one to two feet long. When prepared for market, these fish are called Poor Johns.

HALIBUT: this fish is of the flounder genus, and is very large, sometimes growing to the weight of three hundred pounds. It is the most voracious of all fish, and sometimes swallows the lead with which the seamen sound the deep. Its flesh is coarse, yet it is eaten here and in Europe.

HAMSTER: this quadruped resembles the rat family. It is about eight inches long, of a reddish gray color above and black below. It is found in Europe and Asia. It forms burrows in the ground, where it lays up corn and grain for its winter provision. There are several other species.

HARE: there are many species of this quadruped. They are slender, graceful little creatures, with long ears, which are constantly moving, and very prominent eyes, with which they can see both before and behind. Their fore legs are much shorter than their hind ones, which makes it easy for them to ascend hills or even mountains. Their motion when running is a kind of gallop, and they move without any noise, as their feet are covered with hair. They feed principally at night upon herbs, roots, leaves, fruit, and grain, and sometimes the bark of trees. They may be domesticated, and then display sagacity and affection. The Hare is very much hunted, and such are its numbers in England, that four or five hundred of them are sometimes killed in one day's sport. The Common Hare of Europe is about two feet long, of a brownish red color. The Alpine Hare is about nine inches in length, and is found in the mountains of Asia. The Ogotona Hare resembles the preceding, and is found in the same regions. The Calling Hare is a native of Russia. It has long, soft, smooth fur, of a brownish color. Its voice is like the piping of a quail, and the note is repeated three or four times successively, and may be heard at some distance. The American Hare, improperly called a rabbit in the U. States, is very common in some parts of N. America, and many are destroyed annually for their flesh and fur. It does not burrow under ground like the European Hare, but inhabits hollow trees and the crevices of rocks. The Little Chief Hare inhabits the Rocky mountains, among heaps of loose stones. It has a peculiar and shrill cry. The Polar Hare is found near Baffin's bay; it is quite white. The Prairie Hare is found in Missouri, and has very thick, white fur.

HARRIERS: these birds are distinguished from the buzzards by having a collar of rigid feathers around the face like the owls. They are bold and active, and pass their time about marshes and ponds, feeding on reptiles, mice, fish and birds. There are several species inhabiting this continent, and two or three in Europe. The Hen Harrier or Marsh Hawk is common with us, and also in Europe and Africa. It is about twenty inches long, of a bluish gray color. It frequents open, low, and marshy situations, over which it skims in quest of mice, lizards, and frogs. It derives its name from its thefts in the poultry-yard. The Marsh Harrier is found in Europe, but it is not very plentiful, except in England, where it abounds in the marshy districts. It is of the same size as the preceding, and of a brown color.

HARRIER: a kind of dog used in England for the chase.

HARTBEEST: this quadruped is a species of antelope, and is about six feet long. Its color is a deep fawn, marked in some places with black. The horns are very long and thick, and bending backwards horizontally at the top. These creatures associate in great herds, and run very fast, although they seem to move heavily. The flesh is fine: it is found in Africa.

HAWFINCH: one of the numerous species of European finch, of a brown color, and six or seven inches long.

HAWK: this genus of birds, of the falcon tribe, are bold and sanguinary, seizing their prey upon the wing, and sometimes pouncing upon it from above. There are many species in both continents.

HEATH-HEN: see Grouse.

HEDGEHOG: this quadruped is about a foot long, covered with prickles, about an inch in length; its body is thick, and can be rolled up in a ball at the animal's pleasure. It is nocturnal, concealing itself by day, and feeding at night upon insects, snails, eggs and fruit. It is torpid in the winter season. Its gait is very slow, and it has but little intelligence. It is found in Europe. The Egyptian Hedgehog is a little smaller than the preceding, with long ears. There is a species in Java eight inches long, with very long spines.

HERON: a genus of birds which reside on the banks of lakes and rivers, or in marshes, feeding on fish, field mice, and small reptiles. The legs and bills are long. They migrate in large marshalled flocks. The Great Heron of America inhabits the Atlantic states, but is not common. Its favorite resort is in dark and swampy solitudes; length, four feet four inches. The Common Heron is dispersed over most countries of the Eastern continent. It dwells in woods, near lakes, rivers or swamps. It wades into the water, and there waits with a demure, melancholy air for its prey. When the female is sitting, the male fishes for her and brings her a portion of his captures. The other foreign species are, the Little Egret, which is pure white, the Night Heron, Common Bittern, and some others. The Great White Heron, or Great Egret, is a tall and elegant bird, of a pure white. It is found in both continents. The following are American species: the American Night Heron or Qua Bird, a shy nocturnal species, often filling the dark, secluded swamps with its confused, choking notes; the Snowy Heron, Louisiana Heron, White Crowned Heron, Blue Heron, American Bittern, Green Heron, and Least Bittern. The Agami Heron is a S. American bird.

HIPPOPOTAMUS: this is among the largest of quadrupeds, being sometimes twelve feet long and six feet high. Its body is very massive, its legs very short, and its head excessively large. The skin is extremely thick. It lives on the muddy banks of rivers in all parts of Africa, diving on the approach of danger. It eats grass, and generally feeds at night. It swims well, and walks on the bottom with ease. The negroes consider its flesh a feast.

HOBBY: a falcon about fourteen inches long, of a bluish black color, found in Europe.

HOG: of this animal there are many breeds, all proceeding from the Wild Boar. It was originally confined to the Eastern continent, where it is still hunted. The sport is animated, but not unattended with danger, from the fierceness and strength of the savage brute. The domestic species are spread over most parts of the globe, and constitute one of the most important articles of food. The Babyroussa of India is a species of Hog. The Peccary and Tapir resemble the Hog, but are of different genera.

HOLOCENTER: of this fish there are several kinds in the Indian ocean, remarkable for their brilliant colors: they resemble the perch.

HONEY-GUIDE: see Bee.

HOOPOE: a bird eleven inches long, of a brown color, with a tuft of red feathers upon its head; found in the Eastern continent. There is another species in Madagascar.

HORN-BILL: a genus of birds, inhabiting the tropical parts of the Eastern continent: the bill turns up like a horn. There are six species.

HORNET: a large, bold, venomous species of wasp, inhabiting both continents. It has a passion for flesh, and sometimes two or three will attack a small bird, kill it, and devour it.

HORN POUT: see Pout.

HORSE: this animal is now only known in a domestic state, or as wild, being but the offspring of domestic varieties. The finest breed is that of Arabia. Most countries possess varieties of this animal peculiar to themselves. The Horse may be considered the most valuable of all the brute creation to man. He combines strength, speed, and docility beyond any other animal. The wild herds of horses in the Western regions, Mexico, and S. America, are sprung from the horses brought into the country by the Spaniards. In cold countries, as the Shetland islands, this animal dwindles into a pony. The Ass, Quagga, Zebra, Dzhiggtai and Dauw belong to the Horse genus, but are different species.

HUMMING-BIRD: of this genus there are more than one hundred species, all confined to tropical America, except the Ruby-throated species, which visits the U. States in summer. They are among the most admirable of the animal creation; their colors are as brilliant as those of gems; they dart through the air on humming wings, with the swiftness of arrows; feed on the honey of flowers; and build their nests of the down of plants. It almost seems as if they were the proper inhabitants of some brighter world, which had by chance wandered to our earth.

HUSO, or Isinglass Fish, is from fifty to four hundred pounds' weight. It is taken in great quantities, in large European rivers, for the isinglass which it furnishes. This is procured in the form of jelly by boiling the fish, which when dried becomes isinglass.

HYENA: a voracious African animal, somewhat resembling a wolf. It feeds on flesh, and prefers that of decayed bodies. It is very ferocious. There are two species, the Striped and Spotted; the latter is used at the Cape of Good Hope for hunting. In some parts of Africa, the Jackal, the Hyena, and the Vulture may be seen feeding on the same carcass.

HYENA DOG: a ferocious animal, hunting in packs at night in Southern Africa.

I.

IBEX: a quadruped of the goat family, about five feet long, found in the most craggy parts of the Alps and Pyrenees. It is of a gray fawn color, white below, with a line of black along the back. It resembles the domestic goat, except as regards the horns, which are much longer. It runs so fast that it is very difficult to catch it, and the pursuit of it is very dangerous; sometimes, when it is hard pushed, it turns upon the hunter, and precipitates him down the rocks. Sometimes it throws itself down a precipice, and falls upon its horns in such a manner as to escape unhurt. There is a species of Ibex in Abyssinia, and one in the Caucassian mountains.

IBIS: a genus of birds frequenting the margins of streams and lakes, feeding on worms, insects, shell-fish, and vegetables. Some species inhabit all parts of the world. The Scarlet Ibis lives in the warm parts of America, and is a very brilliant bird, about two feet long. Its feathers are used for various ornaments. The White Ibis resembles the preceding except in color, and is found in the same countries. The Bay or Glossy Ibis is about two feet long, of a bright chestnut color. It inhabits nearly all parts of the earth. The Sacred Ibis of Egypt is white. Beside these there are four species of the Wood Ibis, in different countries, one of them being an inhabitant of America.

ICHNEUMON: an animal somewhat resembling the weasel tribe, having a long body and short legs. The Egyptian Ichneumon is of a fawn color. It was formerly venerated for destroying reptiles and the eggs of crocodiles. It is sometimes domesticated. There are several other species.

IGUANA: a lizard five or six feet long, found on the marshy lands in S. America, and often eaten by the inhabitants.

INDIGO-BIRD: a beautiful little American songster, of the finch genus.

INSECTS: the word insect means cut apart; it is applied to this class of animals from their having the appearance of being divided into two parts. They include bees, wasps, flies of many kinds, gnats, butterflies, spiders, moths, ants, and many other things. They are divided into several orders. The first consists of those that never have wings, as the spider, flea, louse, &c.; the second consists of those that have wings, but cased up so as not to appear when first produced, such as the grasshopper, earwig, and dragon-fly; the third is of the moth and butterfly kind; the fourth order consists of Insects which come from a worm instead of a caterpillar, such as beetles, bees, flies, and gnats.

In Insects there are two kinds of eyes; one kind are simple and smooth; others are composed of a great multitude of magnifying lenses. The eye of the butterfly has seventeen thousand two hundred and thirty-five. The organ of hearing is imperfectly possessed by Insects. They have no lungs, and no proper voice, yet possess the means of producing sounds. They breathe by means of two tubes, one on each side of the body. They feed on all kinds of matter, animal and vegetable; each Insect giving, however, a preference to a particular kind. One of the most remarkable things in the history of some Insects, is their transformation from one state to another. The first is that of the larva or caterpillar, which is hatched from the egg; the second is the pupa or chrysalis state; the third is the perfect state, in which the creature, having cast its skin, takes wing and appears in the form of a butterfly, moth, or ephemera, according to the species.

ISATIS: the Arctic Fox.

J.

JABIRU: a bird of the crane kind, six feet long, with a beak thirteen inches in length, feeding on fishes and reptiles, and inhabiting South America. There are other species in different parts of the world.

JACCHUS: a genus of S. American apes, about the size of squirrels, of a gentle nature and easily tamed.

JACKAL, or Chacal: a quadruped resembling the wolf, and inhabiting the warmer parts of the old continent. Its color is a yellowish gray; its size is somewhat greater than that of the fox. It is as voracious as the wolf, hunts in packs, attacking all sorts of beasts and birds, and often fills the air with doleful howls. When it cannot get other food, it digs up dead bodies.

JACKDAW: a species of crow inhabiting Europe, of a black color, and about thirteen inches long. In England, it is often seen around ruinous buildings. It is capable of being tamed, and can articulate some words. It has a turn for theft, and will often secrete money and jewels.

JAGUAR: a South American animal, of the cat kind, about the size of the cougar. It is of a fawn color, marked with circles of black. It inhabits thick forests, and sometimes destroys cows and horses. It also feeds on fish, which it entices to the surface by its spittle, and then knocks them out of the water with its paw.

JAY: of this bird there are several species. They are noisy and inquisitive, and have brilliant colors. There are five species in the U. States, the most remarkable of which is the well-known Blue Jay; an artful, thievish bird, of very magnificent plumage. He may be considered a sort of fop of the forest, and, like other fops, displays great conceit. There are four other species in the U. States, and several foreign species.

JERBOA: a curious little animal, six inches in length, having very short fore legs and long hind ones. When attempting to escape, it makes prodigious leaps. In form it resembles the Kangaroo. It inhabits Africa. There are two or three other species in Asia.

JER-FALCON: see Falcons.

JOHN DOREE: a small fish found in the European seas, and much admired for the table. It is of an olive color, and when living has the appearance of being gilded.

K.

KANGAROO: a genus of animals of which there are ten species, one in Van Dieman's Land, one in the Aroe islands, one in King's Island, and all the rest in New Holland. They are remarkable for having long hind legs, short fore paws and a strong tail, which assists them in performing their enormous leaps. The Great Kangaroo measures nine feet from the nose to the end of the tail. The general color is a pale brown. The head and neck are small, resembling those of a deer. These animals feed upon plants, which they pull up with their fore paws, and hold them in the manner of squirrels, sitting upon their haunches. They are very timid, and in escaping from the hunters will go thirty feet at a single bound. The flesh is much esteemed, and is said to resemble venison. The other species of Kangaroo are much smaller than this we have been describing; like the opossum, they all possess a pouch near the abdomen, into which the young ones creep in time of danger.

KESTRIL: this is the most elegant of the small European hawks. It is fourteen inches long, inhabits rocky coasts and ruined towers, and feeds upon field mice, frogs, and small birds.

KILDEER: a well-known species of plover, taking its name from its calling out in a loud voice, *kildeer*, *kildeer*. It is common throughout the U. States, and frequents low meadows and sandy plains in the vicinity of the sea. When it has young ones, it attempts to draw the attention of the passer-by, by affecting to have a broken wing. It feeds at evening upon grasshoppers, crickets, &c. It spends the winter to the south of New England.

KINGBIRD, or Tyrant Flycatcher: a smart, quarrelsome bird, about eight inches long, seen during the warm season, throughout the U. States, sitting upon the top of a mullein stalk, or the dry limb of a tree, and occasionally darting at the bees and flies that chance to be passing by. He feeds upon all sorts of winged insects, and various kinds of berries. His song resembles the jingling of a bunch of keys. He attacks every species of bird that comes near his nest, and sometimes will pursue a hawk or crow to the distance of a mile. He attacks the head in a severe and spiteful manner, and the crow is sometimes so annoyed by him as to alight upon the ground to shake him off.

KING-FISHER: of this bird there are several species, one in America, one in Europe, and some others in different parts of the globe. The Belted King-fisher, belonging to America, is a wild, odd-looking fellow, usually seen perched upon a dry tree, over some babbling stream, and often heard to utter a cry like a watchman's rattle. He is of a bluish slate color, marked with white, and is twelve inches long. He feeds chiefly upon small fishes, which he snatches with great dexterity from the water. Sometimes he regales himself upon a passing insect.

KITE: a bird not known in this country, but there are two or three species known in the Eastern continent. They belong to the falcon tribe, and might by a common observer be taken for hawks: they have, however, a peculiar sailing flight. When they cannot find rabbits, squirrels, or mice to feed upon, they will make a supper upon a toad or a lizard. They sometimes make a feast upon carrion. The Mississippi Kite is properly a hawk; it has remarkably long wings.

KNOT: a species of sand-piper, inhabiting both continents. It is ten inches long, of an ash color. It frequents shores and marshes, and feeds upon worms and minute shell-fish. It is often seen tripping along upon a smooth sea-beach, following the surf as it recedes, and again retreating before it as it comes tumbling in upon the sands. Its flesh is much esteemed. The young ones, being bred in solitude, have little fear, and are easily approached by the sportsman.

L.

LAMA: a genus of very peculiar animals, inhabiting South

America, including the proper Lama, the Paco, and the Vicuna. The Lama is about the size of an ass, bearing some resemblance in shape to the camel, without the humps. It possesses the gentle temper and mild aspect of the sheep, yet it is capable of performing great labor, and is often used for carrying burdens over the mountain passes of the Andes. One of these animals will carry one hundred and fifty pounds' weight. The Lama expresses its resentment by spitting in your face. The Guanaco appears to be a variety of this animal, but somewhat larger, and having hair or fur of a different color.

LAMMER GEYER, or Bearded Griffin: a bird partaking of the mixed qualities of the vulture and eagle, inhabiting the mountainous regions of the Eastern continent, and called Lammer Geyer, or Lamb Killer, by the inhabitants of the Swiss Alps, on account of its frequent depredations upon the flock. It is of a grayish brown color, and four feet seven inches long.

LAMPREY: the Sea Lamprey is two or three feet long, of a yellowish color, and has a long flexible body like an eel. It lives in the mud of bays and creeks. The River Lamprey is much smaller than the preceding, and lives in fresh water. They are both valued for the table.

LANNER; a species of European falcon, formerly used in falconry.

LANTERN-FLY: an insect having a luminous head, which at night gives as much light as a small candle. Several of these put together are sometimes used as a torch to light travellers on their way, during a dark night. They are found in S. America.

LAPWING: an European bird, twelve inches in length, of a deep green color above, and white beneath, with a black head. It feeds upon worms, and when it has young ones practises many deceptions to assist their escape from a pursuer. It breeds in marshes.

LARK: of this genus there are many species. The most interesting is the Sky-lark of Europe, which is probably the finest feathered songster of its clime. It is about the size of our bluebird, and of a modest gray color. It rises spirally upward, singing as it flies, until its song is lost to the ear and the image fades from the sight. Nothing can exceed the melody of its notes. The interest is perhaps increased by its being associated with the mildest seasons and the sweetest landscapes. The Woodlark is nearly of the same size. Its song is equally rich in tone, but less varied. In its flight, it describes wider circles than the Sky-lark. The Shore Lark is known in this country as well as in Europe. It sings pretty well, resembling the Sky-lark in its habits. It is common in the Southern states, but is rare at the north. Our Meadow Lark is ranked by Nuttall among the starlings.

LEECH: this curious creature lives in pools and running streams. It has the form of a worm, and moves rapidly in the water. It is common in this country, but the Leeches used for bleeding are chiefly brought from Europe, they being more active and efficient. The mouth of the Leech is composed of two lips, instruments for piercing the skin, others for sucking the blood, and a throat through which it swallows. The lips and mouth are formed of very soft and pliable fibres, so that they readily adapt themselves to any object to which they are applied. The instrument for piercing the skin is within the mouth, and is of a triangular form, and furnished with sharp teeth, visible only through a microscope. The tongue is very small, and serves as a piston for drawing the blood from the wound. This blood remains in the body of the Leech for many months, and probably at length exudes through the pores of the skin. It can live for months and years in a vessel of water, without food.

We have here been describing the Common Brown Leech, which is from two to four inches long. The Horse Leech is larger and more voracious. There are several other species of various sizes. In certain parts of Asia, they are so abundant, in some of the pools, as to render it dangerous to bathe in them.

LEMMING: a genus of quadrupeds, resembling the rat, and remarkable for their migrations. The Norway Lemming is about five inches long; its color is tawny, variegated with black. The hind legs are longer than the fore paws, enabling it to run rapidly. The migrations of this animal take place about once in ten years, probably from want of food, or from excessive multiplication, or perhaps forewarned of the severe winter, which generally follows their removal; this always occurs in the autumn. They move in a square, by night, lying still by day. Wherever their motions are turned, nothing can stop them; they go directly forward, and from the time they first set out, they never think of retreating. If a lake or river come in their way, they all take to the water, and swim across it. If they meet a boat, instead of turning out for it, they mount directly up the side, and pass over it. If a stack of hay chance to be in their path, they gnaw through it instead of passing round it. Thus they proceed, devouring every root and vegetable in their way, and giving the meadows the appearance of having been burnt. After committing incredible devastation on their march, they at last devour one another, and are found dead by thousands, sometimes infecting the air for miles around. Beside the Norway Lemming, there are other species in Europe and Asia, and four in America. The habits of some of these are imperfectly known.

LEMUR: a genus of curious animals, resembling both the monkey and quadruped. They live in troops, like the apes, upon trees, and climb with excessive quickness. They feed on vegetables, fruits and roots. Being nocturnal animals, they are called Ghosts. They appear to be chiefly inhabitants of Madagascar. The principal species is the Mongoos, which is seventeen inches long, of a yellowish gray color. It sleeps by day, and winds its tail round its body to keep itself warm. The Red Lemur is fourteen inches long, of a golden red color; the White-fronted and the Black-fronted Lemur are each about a foot long; and the Ruffed Lemur is about twenty inches long.

LEOPARD: a beautiful quadruped of the cat kind, found in Africa. He is from three to four feet in length, of a fawn color, marked with large, black, rose-like spots. The tail is very long, and annulated with black and white. He is very sanguinary, and preys upon antelopes, monkeys and small quadrupeds, upon which he darts from his hiding-place. He is unrivalled for agility and rapidity of motion. His disposition is fierce and savage, but he may be brought to some degree of tameness, though it is never safe to trust him. The Hunting Leopard or Chetah appears to possess some qualities both of the dog and cat. He is smaller than the African Leopard, of a fawn color above, and white beneath, dotted over with black spots. He is an inhabitant of the southern regions of Asia and Africa. He is domesticated in India, and used for hunting.

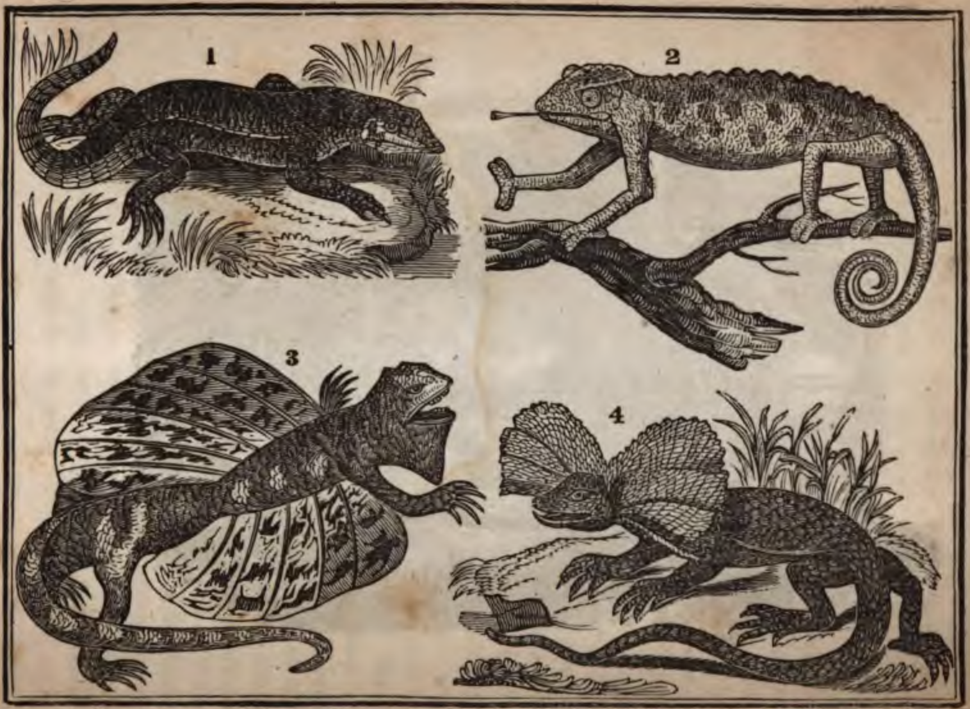
LIMPET: a genus of shell-fish, consisting of many species, some of which are found on the shores of almost every country in the globe. The Common Limpet is of a conical form, and has a strong muscle which enables it to move, and attach itself to other substances, with such strength, that it requires a force of thirty pounds to remove it.

LING: an European fish, three or four feet in length, found in great perfection on the eastern coast of England, where it is caught in large numbers, and salted both for home and foreign use.

LINNET: this name is given to several birds, all of the finch genus. The American Linnet, or Purple Finch, is about six inches long, of a crimson color, with dusky spots on the back and wings. His song is sweet, mellow and varied, and superior to that of the Canary Bird. As he sits upon the top of a tall tree, he pours forth his song, as if bidding defiance to every rival, and is often so lost in the transporting lay as to be unconscious of the approach of any one. He is found in summer in the Northern states, and retires to the south on the approach of winter. The Common Brown Linnet of Europe is five inches long, is a fine singer, and easily tamed.

LION: a quadruped from five to eight feet long, of a fawn color, with a tuft at the end of the tail; the neck of the male is furnished with a long thick mane. He is found in Africa and some parts of Asia. The Asiatic Lion differs from the African merely in the color of the mane, which is yellow, instead of black. Like all animals of the cat kind, the Lion has strong and sharp claws, which he has the power of drawing into a soft substance upon his foot, so that his tread is always soft and noiseless. One glance at his figure satisfies us of his great muscular power. His fore legs are thicker than those of any other animal of his tribe, and the light and graceful form of his hinder parts shows us that he is active, as well as powerful. In seizing his prey, he sometimes leaps to the distance of twenty or thirty feet; with one blow of his paw he can strike a man to the earth; his roar is terrific, and when he springs upon his victim, his shrill and discordant cry is dreadful. This power of voice is useful to the Lion, as the sound startles the other animals from their hiding-places, and exposes them in their flight to their enemy. The mode of his attack, however, is generally by surprise; when within a leap of his object, he springs upon it with a force that often deprives it of life. His chief food is different species of deer and antelopes, but he sometimes lurks about the dwellings of man, for the purpose of feasting upon a stray horse or cow.

A LION.



1. *Great Dragon.* 2. *Chameleon.* 3. *Flying Dragon.* 4. *Frilled Lizard.*

Although of such tremendous power, the Lion has proved himself in captivity extremely tractable and obedient to his keeper, and shows unequivocal marks of gratitude and affection to the person who feeds him. There are many instances also of his attachment to other animals. Several cases have been known of the Lion protecting and cherishing dogs; one formerly in the tower of London is said to have died in consequence of the death of a little dog, who had long been the companion of his den. These facts afford strong proof of the power of early education in overcoming the carnivorous propensities of an animal, not cruel beyond the immediate necessity of supplying itself with food.

LITTLE-PIPE FISH: this is about ten inches in length, and is in some respects a sturgeon in miniature: it is found on our coasts.

LIZARD: this term in its general sense includes a great variety of animals, from the crocodile down to the chameleon. Of those which more properly belong to the lizard tribe, the following are the most remarkable: the Great Dragon, found in S. America, concealing itself in burrows, and biting with great severity; the Ameiva of Guiana; the Green Lizard, inhabiting hot climates, and its colors rivalling gold and precious stones in brilliancy; the Gray Lizard of Europe, remarkable for the celerity of its motions; the Iguana, the Agama, and the Mitred Basilisk, all of S. America. To these we may add the Gecko, Chameleon, Flying Dragon, Skink, Frilled Lizard, and the Two-legged Lizard. These are divided by modern naturalists into several distinct genera.

LOACH: an European fish, about four inches in length.

LOBSTER: this is a creature of extraordinary form, moving with his claws foremost. The mouth opens the long way of the body, and is furnished with two teeth. The tail is jointed, and assists the animal in all its motions. The body is covered with a hard shell, which is changed every year. This change is a painful operation, since, after the shell, by a violent motion, is cast off, the creature is so feeble as to be motionless for a length of time, and is also exposed to the attacks of its enemies. But in about two days, a new shell forms, and the Lobster grows strong and courageous, leaves his hiding-place among the rocks, ventures to the bottom of the water, and engages in combats in which it frequently loses either a joint or a claw. It feeds upon spawn, small shell-fish, and worms, which it scratches up from the sand. There are many varieties of the Lobster, some being two or three feet long, and some not above two or three inches. It is abundant along the American and European coasts, and is much valued for food.

LOCUST: of this insect there are many species; some of which are six inches in length, and others not more than an inch. They are well known to the inhabitants of most parts of the world, and are particularly dreaded in warm climates. In Asia and Africa, their ravages have sometimes produced extensive famine. In 1797, a space of nearly two thousand square miles in Southern Africa was covered with them. They devoured every blade of grass and every green herb in the neighborhood. They were finally driven out to sea by a strong wind, and were then cast upon the shore, forming a mound three or four feet in height, for fifty miles in extent. The air was tainted by the decaying mass to the distance of one hundred and fifty miles.

The Common Locust of the Eastern countries is about three inches in length, and is mentioned in the Scriptures. It appears that the larvæ are even more destructive than the perfect insect. In Barbary, Locusts are eaten, fried in salt. Some of the Eastern nations also eat them.

LOON: the Great Northern Diver.

LORIS: a genus of slow, melancholy, nocturnal animals, resembling the lemur. The Bengal Loris, or Slow Lemur, is about the size of a small cat; its motions are so slow that it has been considered a sloth. Its color is a pale brown. There are two species in Ceylon, and one in Java.

LOUSE: a genus of insects of which there are many species. There is scarcely an animal or vegetable in the creation that has not its own peculiar lice. Man, quadrupeds, birds, fishes, and even insects are tormented with them. They are produced from eggs, and the rapidity with which they multiply almost surpasses calculation.

LUMP FISH, or Lumpsucker: a fish about sixteen inches in length, with a rough skin of a crimson color. It has an aperture on the under part of its body, by means of which it adheres with vast force to any thing it pleases. It is found in European and American seas.

LYNX: an animal of the cat family, found in the northern climates of both continents. It leaps and bounds like a cat, feeds on birds and quadrupeds, and follows its prey to the tops of trees. The keenness of its sight is proverbial. There are three species in America. The Bay Lynx, or American Wild Cat, is the most common, and is occasionally found in the United States. It is about twice the size of a common cat, and is of a reddish color spotted with brown, with short legs and a short tail. The Canada Lynx has been thought by some naturalists to be the same as the European Lynx. The Banded Lynx appears to inhabit the western regions, but is little known. There are several foreign species.

M.

MACCAW: a bird belonging to the parrot tribe. There are many species, all found in warm countries. There are three or four in New Holland, and several in S. America. They are all gay and brilliant birds, from six inches to nearly three feet long.

They go in flocks, fill the air with their chattering, and enliven the forests with their gaudy plumage.

MACKEREL: one of the most beautiful fish in our waters, from ten to fourteen inches long. As an article of food, it has been in esteem from remote antiquity. The Mackerel fishery is very extensive in various parts of Europe, and also in New England, and gives employment to thousands of people. These fish are eaten both fresh and salted.

MADREPORE: see Polypi.

MAGOT, or Pigmy Ape, is about two feet and a half high, when it stands erect. It generally goes upon all-fours. It abounds in Barbary, where the trees are in many places covered with them. It is of a greenish gray color.

MAGPIE: a bird arranged by naturalists under the same genus as the crow, and possessing the cunning, thievish, meddlesome disposition of his family. He is about eighteen inches long, of a velvet black, marked with white. He is common in Europe and Asia. In England and France, he is a familiar bird in the orchards and fields. In America, he is confined to the extensive plains between the Mississippi and the Rocky mountains. He may be taught to imitate the human voice and pronounce words. He is loquacious, and great talkers are said to chatter like Magpies. Lewis and Clark, in their travels to the Pacific, found the Magpies in the western wilderness very familiar and impertinent. They came uninvited to the tents, snatched the meat from the dishes like other ill-bred people, and when the hunters were dressing their game, they would steal pieces of the meat before their eyes.

MAIMON, or Pig-tailed Baboon, is found on the banks of the Ganges.

MAKI: a name formerly given to some species of lemurs.

MALBROUCK: an ape of Bengal, with a body eighteen inches long, and a tail nearly thrice that length.

MALLARD: the Wild Duck,

from which the tame variety is derived. It is common in most parts of the northern hemisphere. It passes to the north in spring, and retires to the south in autumn. It breeds in the interior of our continent, from Pennsylvania to the verge of the Arctic regions. Its nest is commonly on the borders of rivers and lakes, but sometimes at a distance from water, and occasionally even upon trees. Like other Ducks, it does a great part of its business in the night. It gets its meals, dabbles and frolics in the water, holds noisy conversations, and makes long journeys between the setting and the rising sun. At dusk, the musical whistling of its wings is often heard by the wanderer near its haunts. A flock of these birds usually flies in the form of a wedge, and understanding the proverb, "look ere you leap," they wheel round several times to survey the place carefully, before they alight.

MAMMOTH: see Fossil Animals.

MAN, stands at the head of the animal creation. While he is possessed of an animal frame, and is thus linked to other beings of earth, still in many respects he is entirely different from them all. In bodily structure he is essentially distinct, and he is the only living thing that walks erect on the earth. He is the only one that is endowed with hands to execute his purposes, separate from the organs for walking. But beside these physical differences, man is elevated by the gift of reason and the power of speech, entirely beyond all comparison with mere animal creation. It is true that some brutes have a certain degree of intelligence. In some this is mere instinct, and is essentially different from reason, generally belonging to the least sagacious animals; in others, it appears to be a glimmering of reason, but is always limited to the present moment, and is employed for no other purpose than to supply the wants of animal existence. The reason of man, on the contrary, bears him beyond the present, and connects his existence with the past and the future. This is in fact the predominant portion of his nature, and the animal body is the mere instrument of the intellectual being. Man then is immeasurably superior to all other animated creatures on the earth, and seems to be the link between the animal and spiritual world. We can perceive a constantly ascending scale of life in nature. If we begin with the oyster, and proceed to the fishes, the reptiles, the birds, the quadrupeds, we shall find a connected chain, arising from mere sensation up to some degree of intelligence, as in the dog and elephant; man is the next link in the chain; and beyond, as reason and revelation teach, are still higher and more exalted beings.

There is another circumstance which I have already mentioned which eminently distinguishes man from the brutes, and this is the power of language, which enables him to convey with accuracy all his thoughts, feelings, and wishes. It is true that other animals possess the power of communication by the voice, but this is extremely limited.

MAN-OF-WAR BIRD: a name sometimes given to the Wandering Albatross; it is more properly applied to the Frigate Pelican, a bird generally seen on the wing in tropical seas. It is three feet long.

MANAKIN: a genus of S. American birds, with crests upon the head, and of brilliant plumage.

MANATUS: a cetaceous fish from eight to twenty feet long, found in the African and S. American rivers.

MANDRILL: the Rib-nosed Baboon, found in Guinea. He is a savage brute, and is considered, even by the rude negroes, as a very ill-mannered fellow. He is perhaps the worst behaved and worst looking member of the monkey family. He is entirely selfish, eating, drinking, and acting only for himself, without regard to the opinions or feelings of others; and, like all people of this sort, he makes himself very disagreeable.

MANGABEY: a species of monkey found in Madagascar, of a brownish gray color, and about a foot and a half long. Its eyelids are white, and from this peculiarity it is sometimes called the White Eyelid Monkey.

MANGO-FISH: a fish caught in the Indian seas, of an orange color.

MANIS: an inoffensive quadruped resembling the lizards, having a strong scaly covering, like the hedgehog, to protect it from injury. It has a very long tongue, which it uses in the manner of the ant-eater, to take the ants which constitute its principal food. There are three species of this animal, the Long-tailed, the Short-tailed, and the Broad-tailed Manis. They are from fifteen inches to two feet long, and are found in Africa and the Indian islands.

MARGAY: a small animal of the cat kind, found in S. America.

MARIMONDA: a S. American ape, about sixteen inches long, of a black color. Its long tail serves all the purposes of a hand. It lives in troops, and feeds on roots, fruits, and insects.

MARMOT: a genus of quadrupeds found in the northern parts of both continents. In general they have a thick body, strong legs, powerful claws, and sharp teeth. They burrow in the ground, and retreat to their holes when the cold weather comes on. This is formed with great art, having two entrances, both leading to one spacious apartment, warmly lined with hay or moss. A number of Marmots live together in one burrow, and at the approach of winter, finding themselves becoming torpid, they close up the entrances to their holes, and covering themselves up with hay, await the approach of warm weather. The Bobac and the Common Marmot are found in the mountains of Europe and Asia. The Maryland Marmot, or Woodchuck, is common throughout the United States, and is sometimes a troublesome animal, consuming great quantities of herbage, and burrowing in the ground. It is about the size of a rabbit, of a grayish brown. The Prairie Marmot, or Wish-ton-wish, builds his dwelling in the barren tracts of the western country, where his burrow is indicated by little mounds of earth. Whole acres of ground are occupied by thousands of these little tenants, which are however often turned out of their snug retreats by owls, snakes, tortoises, and lizards; these, not having the patience to build habitations for themselves, appropriate those of this industrious Marmot, and frequently destroy the young family. The Hoary Marmot, or Whistler, is so called from its shrill whistle when alarmed. The Indians eat the flesh of this little animal, and make blankets of its skin. It is found in the Rocky mountains. The other American species are Franklin's, Richardson's, Hood's, Beechey's, Say's, Parry's, and Douglas' Marmots, the Short-tailed Marmot, and the Souslik.

MARMOSE: see Opossum.

MARTEN: of this quadruped there are many species, all resembling the weasels, with very short legs and slender bodies. The principal are the Pine Marten, inhabiting the north of Europe, of a brown color, and a foot and a half long; the Sable, found in Northern Asia and N. America, resembling the preceding; and the Pekan, or Fisher, found in N. America. The fur of these animals is very much esteemed, and forms a great article of commerce. They live on small quadrupeds, birds' eggs, &c. See Mustela.

MARTIN: see Swallow.

MASTIFF: a strongly-made dog, with a large head, great lips hanging down on each side, and a fine, noble countenance. He sometimes grows to a large size.

MASTODON: an animal now extinct, and whose former existence is only known by his bones, found deeply bedded in the earth in various parts of the United States; one nearly complete skeleton is preserved in Peale's museum, at Philadelphia. He resembled both the elephant and rhinoceros. He must have been twice as large as the former. The Indians have some ideas of such a creature in their traditions, but how long it is since it roamed the forests, is unknown; probably it is many centuries. What causes terminated this race of monsters it is impossible to tell. Their history is wrapped in the mist of ages. The animal appears to have lived on vegetables, and probably was a harmless and inoffensive creature. It is easy for the imagination to go back to distant times, and fancy herds of this beast shaking the banks of rivers, and crushing the wild vegetation beneath their giant tread; but it is imagination alone that can summon them up from their resting places. We may dig up their bones, and may infer their character and habits from their organization; but we cannot clothe them with life, or recall their history. They may have existed before the continent was peopled with man; they may have dwelt here for ages, the undisturbed monarchs of the forest; and they may have lingered to a later date and become the victims of the savage chase. These are things about which the fancy may busy itself, but it must finally leave their story involved in mystery.

MEADOW LARK, or American Starling, found in every part of the U. States; it is not migratory, but moves about from place to place in quest of food. It is about ten inches long, its color being varied with black, bay, and yellow. It is a sociable, though not a gregarious bird. Its flight is laborious and steady; it often alights on trees, though its food, consisting of worms, beetles, and seeds, is collected on the ground. At various times in the day, its peculiar, melancholy note is heard at short intervals. Its disposition is shy and retiring; it generally lives in moist meadows, or open grassy woods.

MEDUSA: under this name several little curious animals are included, consisting of a gelatinous substance floating in the sea.

MENHADEN, Hardhead, or Bony Fish, is from ten to fourteen inches long; it is taken in immense numbers in the bays and inlets of the New England coast: they are sometimes smoked for food, but are chiefly spread on the land as manure.

MERGANSER: a genus of birds bearing great resemblance to ducks, living in the water, swimming and diving with great facility, and with the velocity of a fish. They dwell in cold countries, and feed on fish and reptiles. In summer, they proceed to the lakes, where they breed; in winter, they betake themselves to the open seas. There are five species, two peculiar to America, and three found both in America and Europe. The Goosander, Red-breasted Merganser, and Smew or White Nun, are found in both continents; the Hooded Merganser is peculiar to N. America. The Red-breasted Merganser is about two feet long, of a black color, glossed with green. The Hooded Merganser is about twenty inches long, with a long crest of different colors upon the head. It is a very elegant bird, and is sometimes called the Hairy Head.

MERLIN, or Stone Falcon, is of the falcon genus, being about a foot long, of a bluish gray color, with spots of reddish. It is found in Europe, and was a favorite in the days of falconry.

MILLEPEDES, or Wood-louse, is a well-known insect, found chiefly in cellars, under stones and logs, and other moist, cold situations. It has fourteen legs, and is about half an inch long, of a black color. When touched, it rolls itself into a ball.

MINK: a quadruped of the weasel tribe, nearly a foot long, of a blackish brown color. It is found both in Europe and America. In its habits and appearance, it resembles the otter; it lives in holes on the banks of streams, and feeds on frogs and fish.

MINNOW: a beautiful fish, three inches long, found in clear gravelly streams and rivulets in Europe. It is easily tamed, and when in captivity may be taught to feed from the hand.

MISSEL THRUSH: the largest of European Thrushes. It is eleven inches long, of a gray brown color above, and yellowish white below. Its song is a shrill, grating scream.

MOCKING-BIRD: a species of thrush, found in the warm and milder climates of America. This famous bird is about nine inches and a half long, of an ash color, and though destitute of brilliant plumage, his form is beautiful, delicate, and symmetrical. His motions are easy and graceful, and his looks full of shrewdness and intelligence. He listens with attention to each passing sound, and imitates with exactness the notes of all the feathered creation. While thus engaged, it might be supposed that all the assembled birds were making a trial of skill; and so perfect are his imitations that even the sportsman is at times deceived, and sent in quest of birds that have no existence around. He is in truth the Orpheus of the forest, for however wild and discordant the tones and calls he imitates may be, he blends them all together with such a tender sweetness, that the originals, mortified and astonished, withdraw from his presence, or listen in silence.

He builds his nest in a bush, thicket, or tree, of twigs, leaves and grass, blended with bits of wood, and so careful is he of his young brood, that he will attack cats, dogs, and men, if they approach the nest; but his most deadly enemy is the Black Snake. As soon as this creature is discovered by the male bird, he darts upon it, strikes it upon the eyes and head, and so unceasing are his efforts, that he soon causes his subtle foe to retreat; then, mounting on the bush which contains the objects of his affectionate solicitude, he pours forth his loudest song in token of victory.

This charming bird is easily tamed, and becomes familiar with his master, playfully attacking him through the bars of his cage.

Here, as in his native woods, he is full of life and action, while engaged in song, throwing himself about as if keeping time to his melody. It is painful to reflect that blindness often terminates the gay career of this interesting prisoner, and drooping in silent sadness, he dies soon after his misfortune. The price given for the Mocking-Bird is from five to fifty dollars; and sometimes even a hundred have been refused for an extraordinary songster.

MOLE: of this curious little quadruped there are several species, as the Common Mole, Star-nose, Shrew Mole, Red Mole, and some others. These live in cultivated grounds, and subsist upon juicy roots and worms. They burrow in the earth, and often form avenues from one nest to another beneath the sod, like the crossing streets of a city. Their eyes are so small and hidden by fur, that many people suppose they have none. The Star-nose Mole has a curious circular fringe round the end of his nose, which resembles a star. The Shrew Mole, like the rest of the tribe, lives chiefly under ground; but he is said to come up every day at twelve o'clock, to enjoy the fresh air. These we have been describing are of a brownish black color; the Red Mole is of a golden red color. The Common Mole inhabits Europe; the other species we have mentioned, belong to North America.

MOLE RAT, or Blind Rat: the habits of this creature are very much the same as those of the mole, and it is very similar in appearance. Its small eyes are covered by a fold of skin, and it is supposed to be blind.

MONA: a graceful monkey of Africa, variegated with black and red.

MONKEY: this, like the word ape, is often applied to all the four-handed race; but properly speaking it does not include either the apes which are without tails, or the baboons which have tails of a moderate length. It is strictly applicable only to the long-tailed kinds, which are very numerous in the tropical portions of both continents. The Monkeys are smaller and of a gentler disposition than either of the above-mentioned races; they are imitative, lively, meddling and mischievous.

The Monkeys of America are divided into the Sapajous, which have long, prehensile tails, with which they cling to the branches of trees, and the Sagoins, which have long tails, of which they make little use. The principal species among the Sapajous are the Coaita, whose tail is nearly as useful as a hand, the Marimonda, the Chuva, Spider Monkey, Red Howling Monkey, Choro, Red-handed Howler, the Weeper, and Capuchin Monkey. Among the Sagoins are the Squirrel Monkey, Masked and Collared Monkeys, and the Saki. Amongst the Monkeys of the old continent the most noted species are the Negro Monkey, Bonnetted Monkey, Mona or Variegated Monkey, Kid Monkey, Malbrouck and Green Monkey. In some parts of Africa, the Monkeys are abundant, and become real pests to the negroes. They are esteemed good food by the inhabitants.

MONGOOS: see Lemur.

MOON-FISH: as the Blue Jay is the beau of the forest, this seems to be the fop of the sea. He is about six feet in length, and is remarkable for the splendor of his colors. He is arrayed in a brilliant jacket of silver green, but, like some other well-dressed people, he is of no great use.

MOOR-COCK: the Red Grouse.

MOOSE: an animal of the deer kind, and closely resembling the elk of Europe. It is found along the northern border of the U. States, and farther north. It is hunted by the Indians of Maine, during the deep snows of winter, and is then easily run down. Its flesh is occasionally brought to the Boston market during the cold season. See Elk.

MORSE: see Walrus.

MOTH: of this insect there are several species; but they are nearly alike in their habits.

They resemble the butterflies, but seek their food in the night. Like other insects, they are hatched from eggs, and appear first in the shape of small caterpillars. In this state they are very mischievous, feeding upon cloth, furs, silk, leather, &c. From the caterpillar, they pass into the chrysalis state, and at last reach their perfection as moths, being then sometimes called Nocturnal Butterflies. They feed upon the juices and honey of plants. They are short-lived, none of them existing beyond a single summer. The Death's-head Moth is a large species, which I have mentioned under Bee.

MOTHER CAREY'S Chicken: see Petrel.

MOTHER CAREY'S Goose: see Petrel.

MOUFLON: see Sheep.

MOUSE: of this little creature there are many species, all belonging to the same genus as the rat. The Common Mouse is an inhabitant of almost every house, but he is very timid, and likes to keep himself out of sight; yet sometimes he will peep out from a crack of a cupboard, and now and then, when the cat is out of sight, and the children are still, he will scamper across the floor. He was not a native of America, but emigrated with the first settlers from Europe. The rat came over in the same way, and puss along with them. The Mouse is by no means a favorite, for he eats the cheese and whatever else he likes; gnaws holes through boards and beams, and builds a city in the walls of the house. Although we pursue him with dogs and cats, and catch him in various kinds of traps, still he lives in the dwelling of man, thus ever making his abode in the midst of his enemies. Wherever man goes he follows, and is never found but in his vicinity.

The other species of Mice are the Field Mouse, Harvest Mouse, Dwarf Mouse, &c. of Europe, the Field Mouse, several kinds of the Meadow Mouse, the Jumping Mouse, the Labrador Jumping Mouse, &c. of America. The Jumping Mice are shaped like the Jerboa, having short paws and very long hind legs. When pursued, they proceed by leaps of five or six feet, and seem to fly like a bird. By some naturalists, they are considered distinct from the Mus genus, to which rats and mice belong. See Rat.

MULE : a mixed breed of the horse and ass, usually of a brown color, with a black stripe along the back. They live to the age of thirty years, and are very strong and sure-footed. They are much used in the Southern states, W. Indies, S. America, and Europe. They are sometimes vicious, and "as obstinate as a mule" is a proverb. They are incapable of breeding.

MULLET : a fish of the European seas, about a foot in length, and particularly abundant in the Mediterranean. It is used for the table, and was greatly esteemed by the ancient Romans. The Red Mullet is found on our coast, but is not eaten.

MUSANG : an animal resembling the Civet, of an ash color, found in Sumatra.

MUSCLE : a genus of shell-fish, of which there are upwards of twenty species. They are found in great abundance both in deep and in shallow waters, and possess the power of moving by means of a fleshy protuberance, which they fasten to the rocks and then draw themselves along.

MUSK : a genus of animals, resembling the antelope. The principal species are the Thibetian Musk, Napu Musk, and Meminna Musk. They are all inhabitants of Asia, are very timid, dwell in mountains, and are hunted for the well-known perfume, called musk. This is a fat, oily substance found on the male, in a bag about the size of a hen's egg. Thousands of these bags are annually sent from Europe to America; those of the Thibet Musk are the most esteemed.

MUSK OX : an animal the size of a small cow, found in the

Arctic regions of N. America. The horns bend down by the cheeks, and then turn up in a sharp point. Its hair is of a dark brown color, very long, and as beautiful as silk. Its legs are short, yet it runs fast, and climbs the rocks with facility. It goes in herds, and feeds on moss in winter and grass in summer.

MUSK RAT, Musquash, or Ondatra; an animal well known in this country, about the size of a rabbit, and resembling the rat in its form and the beaver in its habits. Its teeth are strong, and it sometimes builds houses on the banks of streams; it generally burrows, however, in the earth, on the margin of the water. It inhabits all the colder portions of N. America, and is still found throughout New England, though more rarely than formerly. Its fur is valued by the hatters. The Muscovy Musk Rat, or Desman, is smaller and of a different genus. It lives on the banks of streams and feeds on small fish. A perfume resembling musk is obtained from its tail; it inhabits Russia.

MUSTELA: a genus of quadrupeds including the Pole-cat, Ferret, Weasel, Ermine, Mink, Marten, Sable, Fisher, &c.

N.

NARWHAL: a fish from twenty to thirty feet long, found in the Northern ocean. Its upper jaw is more advanced than the under, and from it project two long, narrow tusks, terminating in a sharp point. These tusks are twisted, and harder than ivory. With them the creature attacks his prey, and often destroys the whale. The Narwhal was long supposed to be the fabulous Unicorn of the ancients.

NAUTILUS: there are two species of this curious little shell-fish; one with a white shell, as thin as paper, and the other with a thicker shell, sometimes of mother-of-pearl color; both these resemble snail shells in shape, and are about six inches across. The former is the Nautilus of the ancients, and the art of navigation probably owes its origin to the expert management of this little sailor. It has eight arms, furnished with membranes, which it raises and expands to the gale, while six others hang over the side of the shell, which are used as oars. Impelled by the breeze, the little animal has the appearance of a vessel under sail; it is frequently seen upon the Mediterranean sea. The Thick-shelled Nautilus is found in the Indian seas.

NEWT: the Warty Lizard.

NIGHT HAWK: a species of American Goat-sucker, about nine inches and a half long, of a deep brown, spotted with cream color. It is seen abroad at all times of the day, but flies usually about dusk, in search of insects. It is very numerous in salt marshes, skimming over the meadows like a swallow. It mounts by quick vibrations of the wing, uttering a sharp squeal, till it gains a high point, it then descends with great rapidity sixty or seventy feet, and wheels up as suddenly; at which instant a booming sound is heard, produced by the expansion of its capacious mouth while it passes through the air. It is found in most parts of the U. States.

NIGHTINGALE: a celebrated bird of the Eastern continent, of a reddish brown color above, and whitish gray beneath; it is about six inches long. It excels all birds in the softness and mellowness, as well as in the duration of its song, which is rendered still more pleasing by being poured forth in the night, when all other birds are silent. It chooses the same tree on which to warble its song for weeks together, if undisturbed, and it may be heard sometimes at more than half a mile's distance.

NINE-KILLER: the Shrike, or Butcher-bird of Europe.

NODDY: a species of Tern, dispersed over the various shores of the ocean. It is about fifteen inches long, of a sooty brown color, except the top of the head, which is white. It is a very noisy bird, alights on the rigging of ships, and will sometimes allow you to take hold of it, but will bite your hand severely for your imprudence.

NUT-CRACKER: an European bird, thirteen inches long, of a rusty brown color, spotted with white. It frequents pine forests, and flies in flocks, feeding upon nuts, acorns, and hard seeds.

NUTHATCH: a genus of birds of which there are several species. They all climb trees, going with equal ease up and down in search of insects, which form their principal food, though they sometimes break open nuts and kernels with their pointed bills. They build in hollow trees, in cold and temperate countries. The European Nuthatch is of a lead color, with an orange breast, and is about five inches and a half long. The White-breasted American Nuthatch is of a lead color above, and white beneath, the size of the preceding. It is found throughout N. America, and has a sharp nasal note like *quank*, *quank*, frequently repeated, while it proceeds round the tree, probing and searching it for insects. The Red-bellied and the Brown-headed Nuthatches are both smaller than the preceding, and inhabit America.

NYLGHAU: an antelope of India, about the size of a stag. It has a tuft of long hair upon the throat, conical horns and a tufted tail. It is of a grayish fawn color.

O.

OCELOT: a beautiful animal of the cat kind, found in South America. It is of a gray color, spotted with deep fawn, bordered with black. It is two feet and a half long, and lives upon birds and small quadrupeds. It is distinguished for activity, strength and fierceness.

OLD-WIFE: see Wrasse.

OLD-WIFE: a name sometimes given to the Long-tailed Duck; it is also called South-

southerly, from the noise it sometimes makes.

ONDATRA: see Musk Rat.

OPAH: a brillant fish, about three feet and a half in length. It has no scales, and its smooth skin is variegated with green, blue, purple, and gold. The fins are all of a bright scarlet. It is in fact the peacock of the seas. It is common on the coast of Guinea.

OPOSSUM: a genus of animals, including many species. The Virginian Opossum is of a whitish gray color, its coat being intermixed with coarse white hair, upwards of three inches long. The tail is thick and black, and covered with small scales; by means of this he can hang himself from the branch of a tree to gather fruit, or seize his prey, and his feet are so formed that he can take firm hold even of the smoothest objects. He is a nocturnal and timid animal; his motion on the ground is slow and awkward, but he is perfectly at ease upon the trees. He feeds on birds, small quadrupeds, insects, and fruits. He makes his den in thick forests in a hollow tree, where he sleeps during the day; he is found in the warmer parts of the U. States. He is frequently hunted; his flesh is said to resemble that of a young pig, and is considered a treat by the Indians. The female is remarkable for having an abdominal pouch, like the kangaroo, to which the young ones retreat in time of danger. This is the only species in the U. States. There are several others in Mexico, S. America, and New Holland. In the latter country is the Flying Opossum, which resembles the flying squirrel, though much larger. Some of these species are destitute of the pouch.

ORANG OUTANG: the history of this animal has been involved in some obscurity; it has sometimes been confounded with the Chimpansé of Africa. It inhabits Cochin China, Malacca, and the Asiatic islands, and possesses a countenance more nearly allied to man than that of any other animal. The frame is less

THE OURANG OUTANG.

like the human frame than that of the Chimpansé. It is capable of walking nearly erect, but the usual gait on the ground is like a cripple who supports himself on his hands and draws his body forward. It is probable that it seldom walks on the ground; its home seeming to be in the trees.

A young Orang Outang was brought to Boston in 1831, from Borneo, and was exhibited in the country for nearly two years, when it died. It had very much the appearance of an unhappy little negro, who was sick of the world, and wished to have as little to do with its inhabitants as possible.

The Orang Outang belongs to the family of apes; it has four hands, long arms, long fingers, with a thumb on each hand; all the fingers and the thumbs of the four hands are furnished with nails. He is covered with a thin coat of reddish brown hair. He lives upon fruits, and in a wild state is fierce and formidable, being sometimes six or seven feet tall. When tame he appears to acquire a quiet disposition, and has a grave, melancholy air. He is easily taught to sit in a chair, to drink from a cup, and to perform many actions in imitation of those around him. See Pongo.

ORIOLE: there are several birds of this name, as the Golden Oriole of Europe, several species in Asia, the Baltimore and Orchard Orioles of the U. States, and others in S. America. Although they all bear a considerable resemblance to each other, the American Orioles are arranged by modern naturalists as belonging to a different genus from the foreign ones. They are considered by Mr. Nuttall, who is very accurate in these matters, as Troupials. The Golden Oriole of Europe is ten inches long, of a brilliant yellow color. The Baltimore Oriole is about seven inches long, of a black and orange color. It builds its nest with exquisite skill, in the form of a sack, and attaches it to the extreme end of an elm or other tree. Here it lays four or five white spotted eggs. Though the tempest sweeps, the eggs or the young birds swing securely in their hammock; though the black snake seeks them for his prey, they are beyond his reach; and though the idle boy may yearn to possess himself of the nest, it hangs high in the air where he cannot climb. The Orchard Oriole resembles the preceding, and often passes for the same bird. His habits are similar, and he is frequently seen building his nest, and rearing his young, side by side with it. He is, however, somewhat smaller and less brilliant in his plumage. See Troupial.

ORTOLAN: a species of Bunting six and a half inches long, of a reddish gray color. It is famous in Europe for the delicacy of its flesh. It is fattened in great numbers, by being shut up in a dark room, with just light enough for it to pick up the millet and oats upon which it is fed.

OSPREY, or Fish-hawk: a powerful bird allied to the eagles, inhabiting Europe and America. It feeds upon fish, upon which it pounces from the air with the swiftness of an arrow. It builds its nest in lonely and elevated situations; this a rude mass of sticks four or five feet high, lined with cornstalks, mulleins, and dried grass. Many of them build together; no less than three hundred nests have been found on a single island near Montaug Point.

OSTRICH: this bird, with the Rhea, Cassowary, Emeu and the Bustard, belong to one family, though forming separate genera. They generally live in the fields and in desert places, remote from woods; they feed on worms, herbs and insects. They all run with great celerity, and when they fly, they stretch their legs backward, and keep near the ground. The Ostrich is the largest bird in the world, often measuring more than eight feet in height, and as many in length. It is of a black color, varied with white and gray; the feathers on the body are long and waving, and those of its wings and tail are very valuable, being used for ladies' dress. Its skin is very thick, and is used by the warlike tribes of Africa in forming their shields and other armor. It makes its nest in a hole in the sand. The eggs are about the size of a child's head. These are considered a great delicacy, and are prepared as food in many ways. One of them weighs about three pounds.

The Ostrich is a native of Africa and Arabia; it was called by the ancients the Camel-bird. It is hunted with horses, and the chase requires great skill and courage, on account of the impetuosity with which the huntsman is obliged to ride.

OTTER: a quadruped shaped somewhat like a weasel; there are several species. The Common Otter is two feet in length, of a deep brown color, with fine fur, much valued by the hatters. The legs are very short and strong. This creature dwells along the banks of rivers and ponds, swims well, and feeds on fish, frogs, rats, and the young branches of trees. It often amuses itself by sliding down steep banks like a school-boy. The Canadian Otter closely resembles the European one, which we have been describing. The Sea Otter is three feet long, is harmless and playful, living in pairs along the shores of the North Pacific ocean. The fur of all these animals constitutes an important article of commerce.

OUNCE: a beautiful animal of the cat kind, found in Persia. It is white, irregularly spotted with black. It is about three feet and a half in length, and resembles a cat in its form. It preys on antelopes and other small animals.

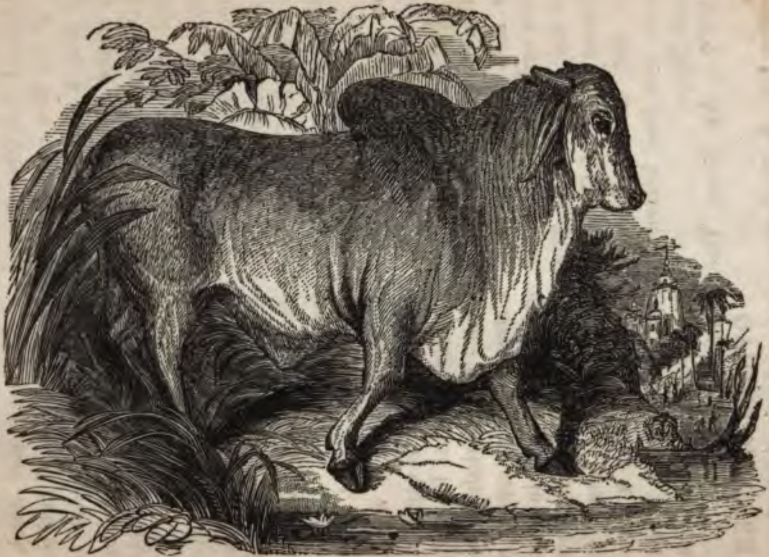
OUNDEROU, or Wanderoo: a species of baboon, found in Ceylon, of a black color, and about two feet high.

OUZEL: the European Blackbird. The Ring-ouzel is also a species of thrush, rather larger than the Blackbird. It is black, with a patch of white, of a crescent shape, on the breast. There are several other species of the Ouzel, in Europe and Asia.

OWL: a genus of birds, most of which are nocturnal, though some of them are capable of seeking their food by day. They have all soft and downy feathers, which enable them to fly without noise. They seize their prey in their claws, scarcely ever feeding upon dead animals. They seek during the day the retirement of the thickest forests, and at night, sally forth and snatch the sleeping bird from his perch. Owls are spread all over the northern and temperate parts of the globe, and some are common to both hemispheres. The Snowy Owl, about two feet long, inhabits the Arctic regions of both continents, visiting the U. States in hard winters. The Burrowing Owl is found on the plains of the Missouri, sometimes forming his own burrow, and sometimes taking up his abode in the hole of the Prairie Marmot. The Red or Little Screech Owl is known throughout all N. America. The Great Horned Owl, remarkable for his doleful nocturnal cry, the Long-eared Owl, the Barred Owl, the Brown Owl, the Barn Owl, are also all inhabitants of the gloomy recesses of our forests. Some of them are known in Europe, others belong to this country alone. They generally feed on birds and small quadrupeds, and several of them fill the woods at night with wailing notes, resembling the cries of wild beasts.

OX: under this genus we may include the several breeds of the domestic Ox, the Buffalo of Africa and Asia, the Arnee of India and China, the Bison of North America, the Yak of Central Asia, the Urus, Aurochs or European Bison, the Gaur of India, and the Gayal of Birmah. These are all supposed each to constitute a distinct species. The Musk Ox of North America is a genus of itself.

The Domestic Ox has been divided into two races, the Straight-backed and the Hunchbacked. The former are common in this country, and most parts of Europe; the other, called the Indian Ox, or Zebu, is com-



THE INDIAN OX, OR ZEBU.

mon in India, and other parts of Asia, and also in Africa. These, like our cattle, are divided in a great variety of different breeds. It is supposed that these two varieties of the Domestic Ox are derived from a common origin, but the source from which they sprung is a matter of uncertainty. The wild cattle of Mexico and S. America are the offspring of the domestic breeds, introduced by the European settlers.

The Domestic Cow has been the merited theme of eulogium in all ages. She is at once the most gentle and useful of beasts; she is peculiarly the friend of children, as she furnishes them with the greater part of their food. Let every child then learn early to make her the object of the kindest care. The most famous breed of Cows for milk is that of the Durham Short-horn, now well known in the United States.

OX-EYE: the Great Titmouse.

OX-PECKER: the Beef-eater.

OYSTER: a genus of bivalve shell-fish, containing a great many species. They are all furnished with the organs of life and respiration, with intestines, a liver, lungs and heart. They attain their growth in three years, are of various sizes, and are found in almost every part of the world. They are incapable of motion, except when driven by the tide. They usually attach themselves by a glutinous substance to the rocks. The Common Oyster is greatly esteemed for the table.

There is a kind in the East Indies, the shell of which is two feet across; it is capable of furnishing a dinner for eight or ten men. The English Oysters have a strong taste of copper, and are not equal to ours in delicacy of flavor. The best Oysters are those caught at New York, and fattened by lying a year in the surf at Cape Cod. The Pearl Oyster is found in various parts of the world.

OYSTER-CATCHER: a genus of birds which derive their name from feeding upon oysters, by putting their bills into the shells when open. They dwell upon the borders of the sea, where they follow the waves in quest of marine insects and shell-fish. They make their nests in the marshy meadows near the ocean. They are shy birds, run and fly swiftly, and have a sharp, echoing cry. The Pied Oyster-catcher is found in the northern parts of both continents, and is about eighteen inches long, black above, and white below. The bill is three inches and a half long, of a bright orange color. There are two other species, one in S. America, and one in Africa, both larger than the preceding.

P.

PACA: a quadruped somewhat resembling the pig; he has a round head, a short snout, and very short legs. He inhabits the banks of rivers in damp and hot places, burrowing in the earth, and feeding on roots. He is peculiar to S. America.

PACO: a quadruped resembling the lama; it is about the size of a stag. Its hair is long, fine, and woolly, of a chestnut gray color. It is found in Peru.

PANGOLIN: the Short-tailed Manis.

PANTHER: a quadruped of the cat kind, inhabiting Northern Africa. It is the size of the Cougar, of a pale fawn color, spotted with black. It resembles the Tiger in form, and is very much like him in disposition, being voracious and cruel, seizing its prey by surprise, and often climbing trees in pursuit of it. When pressed by hunger, it pursues every living creature, and man himself sometimes falls a victim to its rapacity.

PARROT: a large genus of birds, consisting of two hundred species, distinguished by the peculiar structure of the bill, which assists them in climbing. They are gregarious, have generally very brilliant plumage, and chiefly inhabit the southern hemisphere They often build and roost in decayed trees, feeding on seeds and fruits. They are very noisy and unmusical, but when tamed and educated, are readily taught to articulate sounds, either in speech or music. The Carolina Parrot is the only bird of the genus found in the U. States, and usually restricted to the warmer parts. These birds are about thirteen inches long, of a brilliant and variegated plumage. They live in flocks, choosing dark forests, bordering large rivers and streams, where they dart through the green boughs, or sit under the branches arranging their plumage side by side, scratching each others' heads with the affection of doves. They build their nests in hollow trees, where they frequently retire during the heat of the day. The Gray Parrot of Africa is remarkable for its docility and loquacity, imitating every sound within its hearing. It is very long lived; an instance is known of one which lived in captivity seventy-three years. It is about a foot long. The Cockatoos and Maccaws both belong to this genus; the former are distinguished by having crests upon their heads. The forests of tropical countries in both continents are embellished with flocks of birds belonging to these brilliant species.

PARTRIDGE: a genus of gregarious birds, living on seeds, running oftener than flying, getting up with difficulty, and making a whirring noise when on the wing. Their flesh is excellent. The Partridge and Quail of Europe, and the Quail of the U. States, are the best known species. The bird called Partridge at the North, and Pheasant at the South, is the Ruffed Grouse.

PEACOCK: this celebrated bird belongs to the same order as the domestic fowl. It is a native of India, but has been domesticated in Europe and America for a long time. It is a proud and quarrelsome bird, and its voice is shrill and discordant. It is about four feet long, of a green color, glossed with gold. The tail feathers are very long, and colored at the end in the shape of eyes.

These are used for head-dresses and other ornamental purposes. The brains of this bird were in high estimation at the tables of Roman epicures. The Japan Peacock resembles the preceding, and has a crest upon the head.

PECCARY: there are two species of this quadruped in S. America; the Collared Peccary and the White-lipped Peccary. The former is two feet and a half long, of a dirty black and white color. In its figure, it resembles the hog, but the body is thicker, the legs shorter, and the bristles stronger. It lives in forests, in pairs, or in small families. The White-lipped Peccary is about three feet long, and is thicker and stouter than the other species. It congregates together in bands of a thousand, traversing districts, and turning up plantations in search of roots. It also commits great havoc among the sugar-cane, maize, and potato crops. The natives kill this creature with poisoned arrows; the flesh is wholesome, and resembles that of a pig.

PELICAN: a bird of which there are several species, one common to Europe and America, one exclusively American, and one found in New Holland. They are voracious, gluttonous birds, and their voice is a hoarse, hollow sound, resembling a grunt. Skimming over the surface of the water, they pounce upon the fish, and deposit them in the pouch which is under their chin, till it is filled. They then retire to the rocks to swallow and digest their meal. The Common Pelican is the largest of the web-footed birds, and has been known from the earliest times. The ancients used to suppose that it fed its young upon its blood. It is about six feet long, of a white color above, with a yellowish breast. No bird wanders so widely or inhabits such a diversity of climates as this Pelican. He is found in most parts of both continents, living in flocks of about twelve, generally on the ground or in the water, seldom perching upon trees. He frequents the ocean, lakes, rivers and ponds. The

Brown Pelican is only found on the sea-coast in the warmer parts of America, and in the W. Indies. It strongly resembles the preceding in its habits; it is of a dusky ash color, with a red bill, and is about four feet in length. The Frigate Pelican, or Man-of-War Bird, is of a distinct genus. See Man-of-War Bird.

PENGUIN: a genus of birds very much resembling the auks. They inhabit the South seas, from the equator to the antarctic circle. They feed on fish, swim very swiftly, and seldom fly. They go occasionally to the land, where they walk with the body erect, and cackle like geese. They are fortified against cold by an abundance of fat, and build their nests on lonely islands, in company with the Albatross. The Crested Penguin is two feet long, of a black color, and inhabits the Falkland islands, and the adjacent shores of S. America. The Patagonian Penguin is four feet four inches long. There are two or three other species.

PERCH: there is not another fish, with the exception of the eel, so generally spread over the whole globe as various kinds of the Perch. The Common Perch is of a brownish olive color, mingled with a golden hue, eight to fifteen inches long. Besides this, the Silver, Red, and White Perch are found in our rivers and ponds. They are all much valued for the table.

PETREL: there are two distinct genera of this bird, one called Swallow Petrel, the other Petrel. Of the first genus are three species, called by sailors Mother Carey's Chickens, or Stormy Petrels. Their habits and appearance are very similar, and they are all from six to seven inches and a half long. They follow ships in flocks as they leave the coast, to seek for food that may be thrown over the sides, keenly watching the agitated surge for floating mollusca, or animal matter. When they see any thing, however small, they whirl down suddenly, nine or ten of them scrambling for the same morsel, pattering on the water with their feet as if walking on the surface, and now and then jerking and hopping on the water with great alertness. They follow on through storm and tempest, unappalled by the breaking surge, coursing wildly and rapidly over the waves, mounting with the rising billows, and seeming to defy the horrors of the storm that terrifies even the bold mariner. They breed on the rocky shores of the Bahamas and Bermudas, though the sailors, from constantly seeing them so far out at sea, suppose that they hatch their eggs under their wings, upon the water. They also suppose them harbingers of storm and disaster to the vessel in whose wake they follow. The true Petrels are very large birds, living far out at sea, or on desolate islands, in the coldest regions of our globe. They venture farther on the ocean than any other birds; resting upon the waves, they spread their long wings, and are impelled by the blast, without any effort of their own. They feed on fish and mollusca, and when molested have the faculty of spouting oil upon the aggressor. There are but two species, the Giant Petrel and the Fulmar Petrel. The former is forty inches long, of a pale brown color, mottled with white. It is called by the sailors Mother Carey's Goose, and inhabits the two remote extremities of the American continent. The Fulmar Petrel is about seventeen inches long, of an ash color above, and white below. Emphatically the bird of the tempest, it rides securely amid its horrors, choosing the wildest and coldest regions. It follows the whale ship, and as soon as the sailors have captured a whale, and begin to cut it up, thousands of these greedy birds station themselves in the rear, watching for the morsels that are wafted along, quarrelling and struggling for the largest mouthfuls. At St. Kilda, where they breed, they are of great use to the islanders, supplying them with oil for their lamps and down for their beds.

PHALANGER: a species of opossum, found in New Holland.

PHALAROPE: a genus of birds resembling the sandpipers; they are the smallest of swimming birds, inhabiting not only lakes, but venturing fearlessly on the sea. They live in flocks on the coast of the Arctic seas, fly with ease and elegance, and when upon the ground, walk and run with rapidity. There are four species, all of which are found in America, and two common in Europe. The Red-billed Phalarope is about seven inches long, of an ash color. It inhabits the whole Arctic circle. The American Phalarope is about ten inches long, of a brown color. It is found in more southern latitudes than the preceding, breeding on lakes in the interior of America. The Gray Phalarope dwells within the Arctic circle of both continents; the Plain Phalarope is supposed by some to be the same as the preceding, and by others to be a distinct species. These several species pay occasional visits to the shores of the United States.

PHATAGIN: the Long-tailed Manis.

PHEASANT: the birds composing this genus are all natives of Asia, frequenting woody situations, and subsisting on seeds and insects. Their nests are rudely formed upon the ground. The Common Pheasant, originally introduced from Asia, is now spread over most of the southern parts of the old continent. It is a splendid bird, about three feet in length, with a very long tail. It is variegated with green, blue, white, black, purple, and gold. It is common in the parks of England and Scotland. The Golden Pheasant is two feet nine inches long, and inhabits China. It is the most beautiful of all the species. The Ring-necked Pheasant is also a native of China, and has a white circle about the neck. There are one or two species in India. The Ruffed Grouse of America is called Pheasant in the Middle and Southern states.

PHŒBE, or Pewit Flycatcher, inhabits the continent of N. America, from Canada to Florida. Its favorite resort is near streams, ponds, and stagnant waters, on the stake of a fence, or the roof of some barn, where it calls out *phebe*, *phebe*, at short intervals. In the spring, this warble is kept up for hours together, interrupted only as the performer darts and sweeps after its insect prey. It builds in a cave, or under a bridge, sometimes frequenting the same place for many years. Its conjugal attachments are supposed often to last through life.

PIE : the magpie is sometimes called a Pie. In the classification of Linnæus, the Raven, Crow, and Jay, were considered as of the Pie kind. The Crow is now the type of the genus, and these birds are called the Crow kind.

PIGEON : a genus of birds, the species of which are very numerous, and dispersed over the whole globe. They have mild and familiar manners, are remarkably gregarious, and build in thick forests or high buildings. They feed upon grain and seeds. They have no other song than a plaintive *coo*, and are remarkable for their tenderness and constancy. The Ring Dove or Cushat of Europe is about seventeen inches long, of a bluish gray color; the Turtle Dove is eleven inches long, and is found in the warm sandy countries of Europe. It visits England in the summer. This bird has furnished poets with their most tender and delicate allusions. The Stock Dove is the origin of all the domestic varieties; one of which is the Carrier Pigeon, which is employed to convey letters from one place to another. The Wild, or Passenger Pigeon, so well known in the United States, is a splendid bird, sixteen inches long, remarkable for the swiftness of its flight. It passes to the north in the spring, and returns in autumn. The flocks sometimes contain millions. At their breeding places in the western forests they assemble in such numbers as to keep up a perpetual noise like distant thunder, or pouring cataracts. The Carolina Pigeon resembles the preceding bird in appearance, but is smaller. It is often seen in pairs in summer, along the sandy roads. It is sometimes called the Turtle Dove. The Zenaida and Ground Dove, of the Southern states, the Band-tailed Pigeon of the Rocky mountains, and the White-crowned Pigeon of the West Indies and Florida, are the other species found in this country.

PIKE: the Common Pike is about two feet long, and is taken in the rivers and lakes in Europe and America. It is one of the best table fishes in New England. It is bold and voracious, and remarkably tenacious of life. The Sea Pike is rather scarce in the waters of New England. It is sometimes called Bill-fish, from its long snout, and is about two feet and a half in length.

PILCHARD: a fish resembling the herring, though smaller and fatter. It is about eight inches long. It is abundant in Europe, and vast quantities are taken and pickled for use. It is also found on our coast.

PILOT-FISH: this fish is about eighteen inches long, and is found in American and Indian seas. It is well known to mariners, and will keep close to a ship for weeks together, as if it were really its business. The sailors suppose that it goes before the shark, to pilot him to his prey, and often call it a dolphin.

PINTADO: the Guinea-Hen.

PINTAIL: a species of duck, found in Europe and America.

PLAISE: a fish about a foot long, resembling the flounder. It inhabits the Northern seas of Europe.

PLATYPUS: a curious web-footed quadruped of New Holland, living chiefly in rivers, on worms and aquatic insects, with a body like the otter, fur like the beaver, and a bill like the duck. It is thirteen inches long.

PLOVER: a genus of wading birds, associating in flocks, emigrating in companies, and feeding upon worms and insects. The Common Green or Golden

Plover is found in nearly all parts of the world. It is seen on our coasts in spring and early in autumn. It associates for safety during the day, but at evening disperses, and sleeps apart. It is often deceived by the sportsman's bird-call. Its flesh is much valued. The Piping Ringed Plover is seen along our low sandy borders of the sea throughout the summer. Wilson's Plover sparingly inhabits the Middle and Southern states, during the warm season. The Kildeer Plover is as noisy and restless as a politician, constantly crying out his name to those who may be passing by. There are several other species in Europe and America.

POCHARD: a species of duck.

POINTER: a very sagacious breed of dogs, which have an aptitude for pointing out game. The Spanish Pointer is the most easily taught; the English Pointer is the most active and hardy.

POLECAT: an animal of the weasel kind, inhabiting the northern parts of the Eastern continent. It is eighteen inches long, is of a brownish color, feeds upon birds, eggs, and small quadrupeds, and when irritated, emits, like the skunk, an odor so fetid as to be almost intolerable.

POLLOCK: a handsome fish from fourteen to eighteen inches long, caught with the hook, and valued for the table; it is common in the European and American seas.

POLYPI, or Zoophytes: a singular class of animals, many of them having the form of plants, and all approaching the vegetable state. They are destitute of head and eyes, have no organs for the circulation of the blood, or for breathing. Many of them have the principle of life so diffused, that if you cut off a piece, it will soon become a perfect animal. In many cases, several individuals adhere together, and seem to form a compound animal; enjoying at once their individual and their common existence. Many of them have the power of forming fixed coverings in which they reside.

The fresh-water Polypus may often be observed at the bottom of a ditch, or on the under side of leaves, in the form of small lumps of jelly. Among the sea Polypi, the Corallines, Sponges, and Madrepores, are the most remarkable. The Corallines have the appearance of small tufts or bushes, beautifully branched, sometimes seeming to form a shrubbery in the depth of the sea. The Polypous inhabitants are very minute, and their cells on the surface are scarcely perceptible. The Sponge Polypi consist of a mass of jelly, living within the cavities of the sponge, receiving food through them. The Madrepores collect together large houses of calcareous matter, in the cells of which they dwell. The labors of these creatures surpass in magnitude the works of the whole human race. Many of the islands in the Pacific ocean have been reared up from the bottom of the sea by these little creatures. It is supposed that some of the mountains of the present earth were originally reared by them. The coral, of commerce, is produced by Polypi, similar to the Corallines.

PONGO: this ape, inhabiting Borneo and other Asiatic islands, is now considered as the Orang Outang at mature age. It grows to the height of seven feet, and possesses prodigious strength. See Orang Outang.

PORCUPINE: of this quadruped there are several species. The Common Porcupine of Europe is about two feet long, and covered with long spines or quills, tapering to a point. In defending itself, this animal lies on one side, and rolls suddenly with the other upon its enemy. The spines have a poisonous quality, and inflict wounds which are difficult to cure. It has not the power of throwing out its quills, as has been said. The other species are the Couando, and Urson, or Canada Porcupine. The former is carnivorous, the latter feeds chiefly upon the bark of the juniper tree. Its quills are used by the Indians in ornamenting their dress.

PORPOISE: an animal resembling the dolphin, and belonging to the cetaceous fishes. It is about five feet in length, black above, and white below. It is often seen in troops, with a rolling motion, showing itself above the waves. The sporting of these creatures is esteemed by sailors as the harbinger of a storm.

POULTRY: a name given to domestic fowls of all kinds.

POUT: a genus of fishes without scales, and possessing feelers on each side of the head. They are common in the rivers of Europe and America. The common length of the Horn Pout, in New England, is about eight inches; but in the western waters, where it is called Cat-fish, it is sometimes eight feet long. It inhabits lakes, pools, and rivers, and seems to prefer dark, muddy waters. It is sometimes called Bull-head, but the fish to which this name properly belongs is very different. See Sculpin.

PRAIRIE DOG: the Prairie Marmot.

PRAWN: a very little animal of the lobster kind, with a long snout turned upwards, three sets of feelers, and a tail, with five joints. It inhabits the sea-shore, and in Europe is taken in large quantities for food.

PROTEUS: a reptile resembling the salamander; it is about a foot long, and as thick as a man's finger. It is found in lakes in the north of Europe.

PTARMIGAN, or White Grouse, is fourteen inches long, and lives on berries, the buds and shoots of trees, lichens, &c. It is found in the northern regions of both continents. It is of a pure white.

PUFFIN: a genus of birds, resembling the petrels, but distinguished from them by the power of diving. They are almost continually wandering over the sea, frequenting shoals and breakers. They live chiefly on fish. The Cenereous Puffin, or Wandering Sheerwater, visits every part of the Atlantic ocean. It is principally seen in blowing and tempestuous weather, sweeping over the waves for its finny prey. It is nineteen inches long, of an ash color. The Manks Puffin, or Sheerwater Petrel, inhabits the northern seas of both continents, and is about fifteen inches long, of a deep black. The Dusky Petrel resembles the preceding, but is smaller. There is, beside these, another genus of Puffins, including the Coulterneb, &c.

PUG: a variety of dog, derived from the Bull-dog, and resembling it in shape; it is however much smaller, and of a cowardly disposition. What it lacks in courage, it makes up in barking.

PURRE: the Stint.

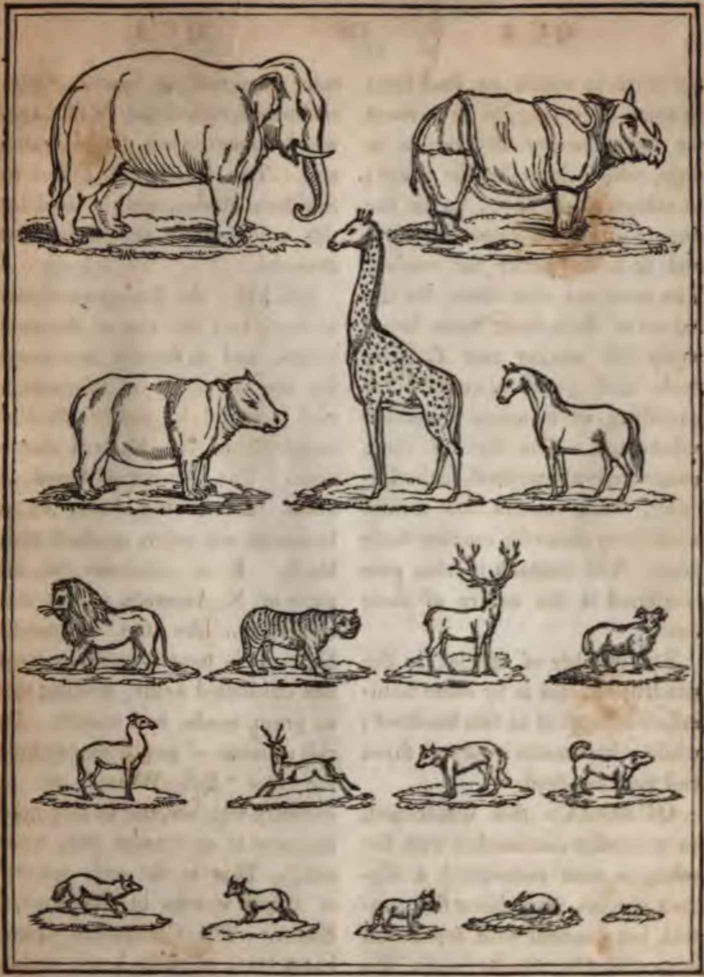
Q.

QUA BIRD: see Heron.

QUADRUPED. If we descend by a regular gradation from man to those animals which approach nearest to him in their nature and habits, we must assign the first rank to quadrupeds. Even those that least resemble us, when they erect themselves in an upright position, show striking marks of their affinity. In their internal structure, we shall perceive that they enjoy many advantages superior to those of the lower tribes of nature. They are placed above the class of birds, by bringing forth their young alive; and they are placed above the class of insects, by having red blood circulating through their veins.

Even in the passions of man, we find in some species of quadrupeds no contemptible rivals. What can equal the attachment of the dog to his master? What eagerness does he show to obtain his caresses; what docility in obeying him; what emotion, what anxiety, what sorrow when he is absent; what joy when he returns; even over the grave that contains his dust, this faithful friend has often been known to breathe his last. Where among us is friendship expressed with greater energy?

The head of quadrupeds is usually calculated for their manner of living. In some it is sharp, to enable the animal to turn up



COMPARATIVE SIZE OF VARIOUS QUADRUPEDS.

the earth in which its food lies; in some it is long, to give room for the olfactory nerves, as in dogs, which hunt by the scent; in others, it is short, as in the lion, to give it the greater strength and fit it the better for combat. The teeth are also fitted for the nature of their food; some being sharp for tearing and dividing flesh, and some calculated for pounding or grinding vegetable substances. The feet of some quadrupeds are webbed, for swimming, while others are armed with sharp claws for rending their prey. The stomach is also proportioned to the nature of their food.

The number of species in the quadruped class is by some naturalists computed at two hundred; while others make it exceed three and four hundred.

QUAGGA: this quadruped, so generally confounded with the zebra, is now considered a distinct species, resembling that animal, but marked with fewer and larger bands, chiefly upon the neck and shoulders. The ground color is a reddish brown. It is sometimes called the Wild Ass, which however is a different animal. The Quagga is found in Southern Africa, and is used by the colonists at the Cape, for draught.

QUAIL: the European Quail is about half the size of the partridge, and is highly esteemed for the table. It is migratory, and is found in nearly all the countries of the Eastern continent. The American Quail is about nine inches long, of a brownish ash color, marked with black. It is common in all parts of N. America, and is not migratory, like the European bird. It is usually seen in open and cultivated fields, feeding upon grain, seeds, and insects. Its call consists of two notes, sounding like "Bob White," or, in showery weather, the farmer may interpret it as "*more wet, more wet.*" This is the only species of Quail known in the United States. The Californian Quail has a crest upon its head, and is a pretty bird, rather smaller than the common Quail. But little is known of it.

R.

RABBIT: this little quadruped belongs to the same genus with the hare; it came originally from Africa and Spain, but it has been domesticated in most countries. There are many varieties, of different colors, some black, some white, and some gray. It was originally of a yellowish gray, with a white tail, and about fifteen inches long. The hare is improperly called Rabbit in this country.

RACCOON: a genus of quadrupeds, peculiar to America. There are two species, one common in N. America, Mexico, and the W. Indies, the other inhabiting S. America. The Common Raccoon is about two feet long, of a brownish gray color, with a white muzzle; the tail is long, and annulated with brown and white. It climbs trees with facility, and runs upon the ground with great quickness. It sits upon its hind legs, and holds its food like a squirrel. When tamed, it is very good-natured, sportive, and mischievous, sensible of kindness, but very unforgiving of injuries. The S. American animal is larger than the preceding, and of a fawn color.

RAIL: a genus of shy, solitary birds, found in all parts of the world, residing in reedy and sedgy marshes, near fresh waters. They walk with ease and swiftness, skim over the water, rather than swim, and dive well, though seldom from choice. They perform extensive migrations, and are principally nocturnal, seldom moving in quest of food except at night; they feed upon worms, insects, vegetables, and seeds. The Clapper Rail, sometimes called Mud Hen, is fourteen inches long, of an olive brown color. It is common in the Middle and Southern states. Its cackle is loud, harsh and incessant, heard principally at night. The Virginian or Lesser Clapper Rail is smaller than the preceding, and strongly resembles the European Water Rail. The Carolina Rail, or Soree, is very abundant on the shores of the reedy rivers, in the warmer parts of the Union. If a stone be thrown in amongst them, there is a general outcry of *kuk*, *kuk*, among the reeds where these timid birds conceal themselves. They are much valued for the table, and are shot in great numbers. The Soree is nine inches long, of a dusky brown color. The Yellow-breasted Rail is a rare bird, and but little known. It is about seven inches and a half long, and is principally found in the northern parts of America, migrating through the western interior.

RAT : of this quadruped there are multitudes of species, spread over the whole world; the principal of which is the Brown or Norway Rat, originally from Persia and India. It is now naturalized in all parts of Europe and America. It is about nine inches long, of a grayish brown color. It has nearly exterminated the Black Rat, which was formerly numerous in England. The Brown Rat lives upon fruit and grain, and is exceedingly destructive, owing to its great numbers. It will devour young birds and small animals, and even its own species. It does not become torpid in the winter, but lays up stores for its support, venturing from the barn or the cellar on every fine day. The Water Rat frequents fresh waters, and feeds upon fish. It swims with ease, although it is not web-footed. It is found throughout Europe and America. In different parts of N. America, there are several kinds of Rats with cheek-pouches, the most remarkable of which is the Camas Rat, or Gopher. They all burrow like the moles, and in many respects resemble them.

RATTLESNAKE : a venomous reptile, inhabiting all the warm and temperate parts of America. There are two or three species. The Common Rattlesnake is from four to six feet long, of a brown color crossed with black. It is harmless when unprovoked, and even gives warning of its approach, by shaking the rattles at the end of its tail. But when pursued, or accidentally trodden upon, it rises up, throws back its head, and inflicts a wound with its long and poisonous fangs, after which it is said to remain inactive for some time. The power of fascination has been erroneously imputed to these serpents.

RAVEN: this bird, of the crow genus, has been known and described from the earliest times, and is a resident of almost every country in the world. He has always been considered a bird of ill omen by the ignorant and superstitious. His sombre appearance, discordant croak, and wild and funereal aspect have universally excited emotions of fear and dread. In ancient times, when divination made a part of religion, all the actions and croakings of this bird were remarked, and his fancied prophetic meanings were fully credited.

He is about twenty-six inches long, of a fine deep black, glossed with purple. His sense of smell and sight are very acute, so that he can discern his food at a great distance. He feeds upon carrion, destroys moles and mice, and even earthworms and insects. He is remarkable for longevity, being known to live more than a century.

RAY: a genus of fish, of which there are many species, found in European and American seas, from two to six feet long. The principal are the Sting Ray, Skate, Thornback, Rough Ray, and Torpedo. They are all furnished with spines, which inflict severe wounds, except the latter, which has the power of giving electrical shocks. Some of them afford good food, and are caught in great numbers.

RAZOR-BILL, or Skimmer: a species of Auk, found in the cold northern regions of both continents. It is about a foot and a half long, of a deep black. It inhabits the same desolate rocks and coasts for years together, laying its eggs on the stones. In the Isle of Wight, it frequents precipitate cliffs six hundred feet above the yawning deep, and there hundreds of them lay their eggs in rows along the rocks. The fowler undauntedly climbs the precipices, collects the eggs, and descends with the same indifference. These are considered a great delicacy. The skin and down of the bird are used by the Greenlanders for various purposes.

RED-BIRD: the Cardinal Grosbeak.

REDBREAST: this favorite warbler is greatly admired for his song and his engaging manners. He has different pet names in the countries where he resides, and everywhere shows attachment to mankind. When the cold grows severe, and the thick snow covers the ground, he approaches the house, taps at the window with his bill, and repays favors with the most engaging familiarity, gathering the crumbs from the table, and expressing his thanks by a sweet warble. In England, where he is called Robin, his song is sweeter than that of any other bird. In the spring, he haunts the garden and the grove, and makes his nest in some concealed spot near the ground. He is of an olive brown, with a red breast. He is unknown in America.

REDSTART: a species of fly-catcher, much resembling the warbler. It takes up its summer residence in every part of N. America, where it breeds, retiring to the W. Indies on the approach of winter. It is about five inches and a half long, black above and orange below. He is full of life, and in perpetual motion, flitting from bough to bough for his insect prey, and flirting his expanded tail like a fan. His notes are very musical and variable; when angry, he utters a loud and snapping chirp. He is also a common bird in Europe.

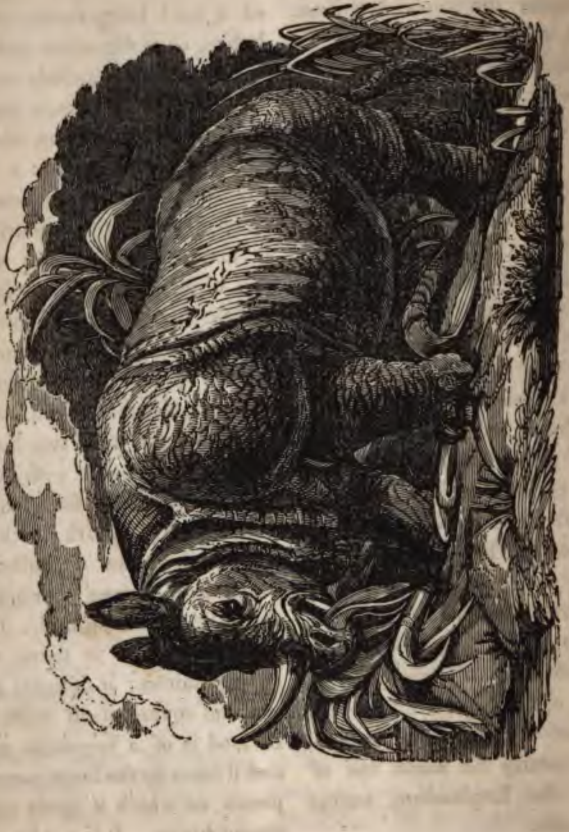
RED-WINGED BLACKBIRD: see Blackbird.

REINDEER: this quadruped is the only one of the deer genus that has been fully subjugated by mankind. He is about four feet and a half long, and is furnished with large, palmated horns. He feeds upon white moss, which he finds under the snow in winter, and in summer lives upon the buds and leaves of trees. To the Laplander, this creature is inestimable; he travels with a sledge easily and rapidly; his flesh is good food, his milk is more nourishing than that of the cow, his coat makes excellent clothing, and his hide durable leather; spoons are made of his bones, and glue is manufactured from his horns. He thus unites in himself all the advantages to be derived from the horse, ox, and sheep. The Reindeer of America is called Cariboo, and was till lately considered the same species as the European. There are two varieties, one inhabiting the barren grounds of America, and the other the woody and more southern districts. The Indians of the barren lands could not exist without this animal, making nearly the same use of him as the Laplanders, except for draught.

REPTILES: a class of animals between birds and fishes, generally crawling or swimming, of a cold temperature, sluggish habits, slow digestion, and obtuse senses. They include serpents, lizards, tortoises, frogs, toads, salamanders, the proteus, and siren.

RHEA, or Touyou: a bird of the ostrich family, and sometimes called the American Ostrich. It is about six feet long and six feet high, and is white with gray wings. It is found in Patagonia.

RHINOCEROS: there are several species of this quadruped in India, Sumatra, and Southern Africa; some with two horns on the nose, and some with but one. It is about twelve feet long, and covered with a dark thick skin, impenetrable to a bullet, and folded in a curious manner upon the sides of the animal. Its habits are similar to those of the hippopotamus; it delights in water, and covers itself with mud; its food is of a vegetable nature, and it tears up the large succurlent plants on which it feeds with its strong horns. It is not by nature



THE ONE HORNED RHINOCEROS.

a savage beast, but suspicious and timid in its manners; when roused it makes a fierce and successful resistance to the tiger itself. It then rushes forward in a headlong manner, with its head down, for the purpose of receiving its enemy on its horn, which inflicts a deadly wound. This horn is more valued than the ivory of the elephant.

RIBAND-FISH: this species is a native of the Mediterranean, and is about four feet long. Its color is bright red, and its long tail, floating about in gentle undulations, gives it a beautiful appearance in the waters.

RING-DOVE: see Pigeon.

ROACH: a fish in esteem for the table, weighing about a pound and a half. It is found in large rivers in Europe and America.

ROBIN: this favorite bird is a species of thrush, and is found throughout N. America. He is nine inches and a half in length, of a dark ash color above, and black and red below. He arrives in New England early in April, and is welcomed with peculiar pleasure as the preluder to the general concert about to burst upon us. He builds his nest upon an apple-tree in the garden, or upon a bush in the woods, of leaves and old grass, and there rears his young with anxious solicitude. He has a loud and sharp note when surprised, but at other times is listened to with pleasure. The English Robin, or Redbreast, is a smaller bird, of the Warbler genus.

ROCKY-MOUNTAIN Goat: this quadruped inhabits the lofty peaks of the Rocky mountains. Its manners resemble those of the domestic Goat. It produces fine wool, intermixed with coarse hair.

ROCKY-MOUNTAIN Sheep: see Sheep.

ROEBUCK: a species of deer of a grayish fawn color, with small horns, and about three feet and a half long. It is found in Europe.

ROLLER: an European bird, remarkable for its beauty; it is thirteen inches long, of a reddish brown color; the head, neck and breast are of a light green, and the tail blue and forked. The legs are very short. It is common in Germany, and migrates from one country to another. There are two other species in Europe and Asia.

ROOK: a species of crow, found in Europe, of a fine black, about a foot and a half long. There is a white variety, which however is scarce. The Rook is stationary in England, but is migratory in other countries, where the numbers are so great as to darken the air. It breeds year after year upon the lofty branches of the same trees, and there are sometimes twelve nests upon one tree. It feeds upon insects, and is very useful in preventing the increase of the cockchaffer; it likewise commits great inroads upon the wheat fields, thus proving both a blessing and a curse to the farmer. It is not a native of America.

ROUGETTE: see Bat.

ROUSETTE: see Bat.

RUD: a fish inhabiting lakes and rivers in Europe, of an olive color, with a short and broad body.

RUFF: a species of sandpiper, found in flocks through the principal parts of the cold and temperate climates of the northern hemisphere, breeding in high latitudes, and migrating to warmer climates on the approach of winter. The male is called Ruff, from a ruff of long feathers about the neck; the female is called Reeve. They are about a foot in length; the usual plumage is brown, but it varies very much at different seasons. They feed upon worms and insects, which they pick up upon the marshes which they frequent.

S.

SABLE: see Marten.

SAGOIN: a tribe of American apes, with a long tail, but not prehensile.

SAIGA: a species of antelope found in the northern parts of Asia; it is about the size of the Virginia Deer, of a grayish yellow. It frequents dreary and extensive deserts, where there are salt springs; its manners resemble those of the chamois.

SALAMANDER: a genus of animals having the form of lizards. There are several species in Europe, and one in N. America; some living in holes in the ground in moist situations, and others inhabiting lakes and rivers. The ancient Salamander that lived in fire is a mere fiction.

SALMON: a long-known and celebrated fish, found in the northern parts of both continents. It is from two to five feet long, of a bluish black color; the flesh is red. It was formerly common in several of the New England rivers, but it has become comparatively scarce.

SANDERLING: the only species of the genus, found in the northern parts of both continents. It is about eight inches long, with the plumage variegated with black, white, and red. It frequents the sandy flats on the borders of the ocean, and is seen in great numbers, running along the strand, busily gleaning shrimps, shell-fish, and marine insects. Its note is a slender and plaintive whistle, uttered at intervals.

SANDPIPER: a genus of birds, some species of which are found in most of the northern parts of both continents. They breed and migrate in flocks, and dwell in marshes, and on sandy shores, near the ocean, where they subsist on small shell-fish, worms, &c. They are a wandering tribe, and breed in the remotest wilds of the north.

SAPAJOU: a tribe of American apes, having long prehensile tails.

SCINK: a species of lizard eight inches long, held in high estimation in Asia, for its supposed restorative powers. It is said to cure many diseases in Arabia, and even to afford a remedy against poison. It burrows in the sand with amazing quickness.

SCOLOPENDRA, or Great Centipede, is so called from the number of its feet. It is found in Africa and the E. and W. Indies, generally in the woods, but it frequently infests houses, and stings the inhabitants. In Europe it is about an inch long, but in the East, it grows to the length of six inches, and as thick as a man's finger. It is covered with hair, and has no visible eyes. The wounds it inflicts are made by two sharp fangs in the mouth, filled with poison. The Gallyworm differs from this animal in having double the number of legs. It is found in decayed trees, between the wood and bark. When touched, it rolls itself up into a ball.

SCORPION: this creature resembles the lobster in shape, though much more hideous. It has two arms and eight legs; the tail is jointed, and furnished at the end with a crooked sting, which makes the insect so formidable. In Europe it is only two or three inches long, but in Africa and the East, it sometimes grows to twelve inches, and its bite is inevitably fatal. It is a spiteful, quarrelsome creature, and frequently devours its own species. It feeds on worms and insects. There are several other kinds, of different colors.

SCREAMER: a S. American bird, about two feet and a quarter long, black above and white below, with a horn upon the head, three or four inches long.

SCULPIN: this ugly fish is called Fatherlasher in England; the head is very large, and the body is covered with long spines, with which the creature defends itself from its enemies. It is not esteemed as good food, and troubles the fisherman very much by swallowing the bait he intends for a more profitable prize. It abounds on the American coast, in Greenland, and in many parts of Europe.

SEA ANEMONE: of this curious creature there are several species: they were formerly esteemed a vegetable production. They are found however to possess the power of locomotion, though generally adhering to rocks in the sea. Their limbs, when cut off, are soon supplied by others; they will live in sea-water, upon the invisible animalculæ.

SEA COCK: a fish found in nearly all seas, about nine inches long. It is good food; it lives on worms, insects, &c.

SEA COW: another name for the Walrus.

SEA DOG: a species of shark, about four feet long. It feeds upon perch. But little is known of its habits and character.

SEA DRAGON, or Pegasus: a fish somewhat resembling the Sea Horse. Its fins look like wings, which have given it the name of Pegasus, from the fabled winged horse of the ancient poets. It is found in the Indian seas.

SEA HORSE: the Walrus; also a small fish of a curious shape, the head of which resembles a horse. It is about twelve inches long.

SEA LION: see Seal.

SEA MOUSE: a kind of sea insect, called Aphrodite. It has an oval figure, and has a cylindrical mouth furnished with feelers. There are several species.

SEA OWL: the Lump Fish.

SEA SERPENT: an animal from sixty to one hundred and fifty feet long, of a serpent shape, inhabiting the sea along the coasts of Norway, and the Atlantic, on the shores of New England. It swims with great rapidity, has a head resembling that of a horse, and often presents an appearance like a long string of kegs. Its existence is pretty well authenticated, though many persons doubt it. In the Mediterranean, and also in the Indian seas, serpents from two to six feet long are often seen; these are land serpents, taking occasionally to the water.

SEA SNIPE: a curious fish inhabiting the Mediterranean sea. It has a long snout, resembling the bill of the snipe. But little is known of it.

SEA WOLF, or Cat-Fish, is a powerful fish, growing to the length of four or five feet; its head resembles that of a cat. It lives entirely on shell-fish, cracking the shell with its strong teeth. It is found in all the northern European and American seas, and furnishes food to the Icelanders. This is distinct from the Cat-fish of the western rivers.

SEAL: a genus of amphibious animals, found in all seas, but chiefly in those of the polar regions. There are many species. Their structure is admirably adapted to their mode of life; the nostrils and ears both closing when the animal dives. Its hind feet alone are used for swimming. Its movements on land are slow and painful, dragging itself forward like a reptile. The Common Seal is killed in great numbers for its oil and skins, which are of extensive importance in commerce and manufactures. It is from four to nine feet long. To the Greenlander, this creature is of inestimable value, as from it, he derives all the necessaries of life. The Harp Seal is so called, from having a black figure upon its skin, in the shape of a harp. It is frolicsome, and lives in vast herds in the Greenland seas. It yields more oil than any other species. The Ursine Seal frequents the islands near Kamskatka, in large families; it is very quarrelsome and tenacious of life, and is about eight feet long. The Hooded Seal, or Sea Lion, is found on the coasts of the South sea. It has a curious loose skin upon the head, which the animal can inflate at pleasure; it is from a foot to a foot and a half in length, and covered with short brown hair. It feeds upon the grass by the sea-side; it is heavy and drowsy, and sleeps a great deal, but is then always guarded by sentinels. Its voice is at times shrill, and at others like the grunting of a hog. It is a dangerous animal, and when attacked, makes a desperate resistance with its strong teeth.

SECRETARY: a curious bird of a gray color, with a crest upon the head, found at the Cape of Good Hope. Its head and claws resemble those of the falcon, but when it stands erect it is more like a crane. It is about three feet tall, and has very long legs. It is a great enemy of snakes, which it kills by a stroke of its strong wing, and then devours. The Hottentots call it the Serpent-eater.

SERPENT: this name is applied to a large class of amphibious animals, which breathe through the mouth by means of lungs, and are destitute of feet, ears, and fins. They have the form and pliancy of eels, and are generally covered with scales; the mouth is wide, and the bones of the belly divided, so as to receive an animal four times as thick as the serpent itself. Some have small, hollow, crooked teeth, capable of being elevated or depressed; others are destitute of teeth; some are venomous, others are not. The venomous serpents are supplied with two hollow fangs in the upper jaw, through a little split of which the venom is introduced into the flesh. This venom when swallowed is harmless, but injected into the blood through a wound, is sometimes fatal. Most serpents cast their skins twice a year. All the species are exceedingly voracious; the voice is a hiss, and the blood is much colder than that of quadrupeds. They are of various sizes, from the Boa, which is sometimes forty feet long, to the smaller species, which are only five inches in length. They are most numerous in hot climates; are more rare in Europe than the other quarters of the globe, and are said to be unknown in Ireland. The well-known venomous qualities of some serpents arm all mankind against the whole race, while, at the same time, they serve, by the fear they inspire, to protect them. Many animals appear to be destined to be the destroyers of serpents, as the ichneumon of Africa; the peccary of S. America, which feasts upon the most venomous kinds; the vultures, hawks, ravens, crows, and eagles. In most inhabited countries, they are comparatively rare, but in the marshy regions of hot climates, unchecked by man, amid the luxurious vegetation, they bask in the sun in thousands, creep beneath the broad leaves and plants, twine around the trunks of the trees, and hang in festoons amid the branches. In such places, they often grow to an enormous size.

The most remarkable species of serpents are the Boa, Anaconda, Blindworm, Cobra de Capello, Common Viper, or Adder, Aspic, or Egyptian Viper, Horned Viper, Annulated Snake, and Jaculus, a swift snake of Jamaica; these are foreign species. Those best known in N. England are the Rattlesnake, and two or three species of Adder, which are venomous; the Milk Snake, Water Snake, Black Snake, a very swift species, Striped Snake, and Green, or Grass Snake, which are not venomous. In the Southern states there are several species of Rattlesnake, the Copper Head, Mocasin Snake, and Hissing Snake, which are venomous; the Horned Snake, Coach-whip Snake, Glass Snake, which may be separated by the stroke of a whip like the Blindworm of Europe, Chicken Snake, Garter Snake, &c.

SERVAL: a quadruped of the cat family, of a fawn color, spotted with black. It inhabits Southern Africa.

SETTER: a beautiful English dog, used for hunting, and possessed of exquisite scent and sagacity.

SHAD: this fish resembles the herring in form, but is larger and thinner in proportion. It is found in the northern rivers of Europe and America. In Europe it is an inferior fish. It is here esteemed for the table. Great quantities are taken in Connecticut, and salted and barrelled for use.

SHAG: the Green Cormorant.

SHARK: a genus of dangerous fishes, some species of which are found in all seas. The greatest enemy of mankind among them is the White Shark, which is sometimes thirty feet in length. He is the most voracious of fishes, his mouth and throat are capable of receiving and swallowing the body of a man, he has six rows of hard, sharp teeth, large eyes, with which he can see both before and behind, and a rough, hard, and prickly skin. He is the terror of mariners, attending ships in hot climates, in hopes of prey. He swims so fast, that he can outstrip the swiftest vessel. His greatest enemy is the sucking-fish, which sticks to his body, and gradually drains away all his moisture; his faithful friend, the pilot-fish, has been seen, notwithstanding many doubts, to pilot him to his prey. There are many other species of Shark, as the Basking Shark, Hammer-headed Shark, Long-tailed Shark, Blue Shark, and Sea Fox, or Thrasher.

SHEARWATER: see Puffin.

SHEEP: in a wild state, Sheep are found living in families upon the mountains of Asia, Africa, and Europe; in N. America, they inhabit the Rocky mountains. They appear to consist of two species of Argali. The domestic varieties derived from these, are very numerous; the Merino Sheep of Spain, now introduced into England and America, holds the first rank, for fineness of wool. Great attention is paid to the rearing of this valuable animal in Great Britain. The African Sheep have broad tails; the Astracan breed have fine spirally-curled wool; the Circassian have the tail long enough to sweep the ground. India and China also possess peculiar breeds, but the most useful varieties are found in Europe and America. These diversities are chiefly the effect of climate. The Bearded Sheep of Barbary is a wild and distinct species.

SHIELDRAKE, or Sheldrake: an European species of duck; the name is applied by our sportsmen to several kinds of ducks.

SHINER: a very small fresh-water fish, the sport of boys, who angle for it with a crooked pin.

SHOVELLER: a species of duck.

SHREW, or Shrew Mouse: a genus of small quadrupeds, resembling both the mouse and mole. They have large eyes and short tails.

SHRIKE: see Butcher-bird.

SIAMANG: a species of ape, found in Sumatra. Its fur is thick, black and woolly. It assembles in great numbers at sunrise and sunset, and makes the most hideous cries; at other times it is perfectly quiet. It is very affectionate to its young, and takes great care of its person, washing, rubbing and drying it, in spite of its pettish cries. In captivity it is stupid, and shows no familiarity.

SILK-WORM: this insect is said to have come originally from the northern parts of China, and by degrees, the cultivation of it has extended to Europe and America. It feeds upon the leaves of the black or white mulberry for about six weeks, during which period it changes its skin four times. It then ceases to feed, and begins to form an envelope, or cocoon, of silken fibres in some convenient spot, producing minute threads, till it has formed an oval yellow case, about the size of a pigeon's egg. In this case, it changes into a chrysalis, and in about fifteen days, the moth is produced, which is very short-lived. The cocoons are generally exposed to great heat, in order to kill the insect before the moth is produced, as it discharges a colored fluid which injures the quality of the silk. The length of the thread is from three to five hundred yards, composed of two united filaments glued together. The manufacture of silk goods has been known from the earliest times.

SILVER FISH, or Silver Carp, is the same as the Gold-fish, only changed in color. The Gold-fish turns to a silver color when three or four years old.

SIREN: a reptile two or three feet long, found in the marshes of South Carolina. It is black, resembles an eel, and feeds on worms and insects.

SIYA GUSḤ: the Caracal.

SKATE: a species of fish of the Ray genus, weighing sometimes two hundred pounds. It is of a brownish gray color, thin, flat, and disgusting to look upon. It is found in European seas, and all along the American shores. It is considered good eating in England, but here it is only used for bait.

SKATE-SUCKER: a small sea animal, adhering to fishes of the ray kind. When bruised, it emits a liquor, of a beautiful purple color.

SKIMMER: a genus of birds, with bills longer than the heads. They fly slowly, flapping their wings, and skimming over the surface of the water, in search of prey. When they meet a fish, they drop their lower mandible into the water, and with open mouths receive their victim. They never swim, and keep in small parties near the shore, where they breed on the rocks. They chiefly inhabit tropical climates. The Black Skimmer, or Cut-water, is found in the warmer parts of America, among creeks and inlets. It is about nineteen inches long, and forty-four inches from the tip of one outspread wing to the other. There are two other species; one found in India, and one in tropical America.

SKUNK: a notorious American quadruped, remarkable for emitting a fetid odor, which sometimes diffuses itself over a space of three miles in diameter. Its body is long, its legs short. The Common Skunk of this country is black with white stripes. There are many other varieties in Mexico and South America, differently marked; they constitute, however, but one species. They chiefly feed by night, on eggs and small quadrupeds.

SKY-LARK: see Lark.

SLOTH: of this quadruped there are two species; the Ai, which has three toes on each foot and a short tail, and the Unai, which has no tail, and only two toes. They are scarce and solitary animals, spending their lives among the trees, not upon the branches, but under them, suspending themselves by their legs. They go from branch to branch with rapidity, seizing one after the other with their long claws. They feed upon the leaves, and perform long journeys upon the trees, through the thick woods of S. America. Great light has been thrown on the natural history of these quadrupeds by Mr.

Waterton, who had frequent opportunities of seeing them in their natural state. The Sloth is about two feet in length, and moves upon the ground with difficulty. It was formerly supposed to remain upon a single tree almost motionless for many days, whence its name is derived.

SMELT: a small river fish, found in the rivers and creeks on the borders of salt water. In the fall of the year, great quantities are caught in Europe and America, for the table.

SMEW, or White Nun: a beautiful species of Merganser, about seventeen inches in length. It is a very common bird in Europe, but it is considered doubtful that it breeds in America. It is an active diver, and lives on fish and insects.

SNAIL: a kind of worm or slug, inclosed in a shell, with four horns. The eyes are situated at the ends of the two longest horns; the mouth is placed beneath the short ones, and furnished with eight teeth, with which the creature devours leaves and vegetables. It is very injurious in the garden. It lies torpid in the winter, in a hole in the earth In France, Snails are considered a delicacy for the table, and many persons devote themselves to the fattening of them.

SNAKE: a term often used as equivalent to serpent.

SNIPE: a genus of small birds with long bills, nearly nocturnal in their habits. They usually live in woods, bogs, or marshes, probing the mud for worms and insects, and sometimes turning over the dry leaves of the forest. The species are numerous, and spread all over the world, preferring however cold and temperate regions. They build upon the ground. Their flesh is considered superior to almost any other game. The American, or Wilson's Snipe, closely resembles the Common European Snipe, and is found in all parts of the continent. It is about eleven inches long. There are several other species in Europe and America.

SNOW-BIRD: an interesting

and common species of finch, seven inches long, inhabiting Arctic Europe and America; visiting the milder climes in winter. It is often seen flitting before the snow blast, and picking up seeds, in company with the Snow Bunting, the yellow-bird, and the complaining chickadee. There are other species, which are sometimes called Snow-birds.

SOLE: a flat fish two feet in length, resembling the flounder, and in great esteem for the table. It is now supposed to be an inhabitant of American waters, but was formerly deemed peculiar to European seas.

SOLITARY: another name for the Dodo.

SPANIEL: see Dog.

SPARROW: of this bird there are several species, belonging to the finch genus. They are widely diffused in the temperate and cold climates of both continents; many of them are familiar about the house and garden, often making their nests upon a bush beneath the window. The following species are among the most interesting in this country: the Song Sparrow, or Fringilla Melodia, celebrated for its song, which somewhat resembles that of the Canary Bird; length six inches and a half; the common Snow-bird, seven inches long, of a bluish black color; the Tree Sparrow, six inches long, warbling somewhat like a yellow-bird, as he hops from bough to bough; the Chipping Bird, or Chipping Sparrow, five inches and a half long, very familiar, and probably more numerous than any species of bird in the United States; the Field Sparrow, resembling the preceding, and generally his intimate friend; and the Swamp Sparrow, a lover of marshes and meadows, six inches long. There are one or two other species in this country, and many others in foreign climates.

SPARROW-HAWK: the American species of this bird inhabits the warmer parts of the United States, is eleven inches long, feeds on small birds when he can get them, but in winter will make a meal of a mouse or a lizard. He may be known by an odd jerk of his tail, when sitting upon the branch of a tree. The English Sparrow-hawk resembles the preceding, is twelve inches long, and is a great enemy of pigeons and partridges.

SPIDER: a remarkable genus of insects, with eight crooked legs, eight eyes, and two claws upon the mouth. They are all produced from eggs. In this country they are small and inoffensive, but in hot climates, they grow to the size of a hen's egg; these are covered with hair, and their bite is dangerous. Some of them are of sufficient size to destroy small birds; most Spiders, however, live upon flies, and other insects.

For the purpose of taking its prey, the Spider forms a net, called a web. For spinning the threads of this web, he is provided with four knobs, pierced with holes so fine, that each knob, not bigger than the point of a pin, has above a thousand holes. From every one of these holes, a thread formed of a gummy fluid proceeds, so that every thread of the web is not a single cord, but is composed of at least four thousand strands! Some of these cords are so fine that four millions of them would not make a thread larger than the hair of the head, and yet each one is composed of four thousand strands. The manner in which different kinds of Spiders form their webs is various, but they all display wonderful art and contrivance. Some of them form bridges, by which they may cross brooks and ditches, or pass from one tree to another; some of them are able to float high in the air, and some make their nests under ground. The Water Spider forms itself a dwelling beneath a bubble, and may be seen shining through the water, like a globe of silver. Another kind makes itself a raft, and sails out upon the water like a pirate, to prey upon what it can find.

SPONGE: see Polypi.

SPOONBILL: a genus of water birds, resembling the herons. They have long legs, enormous bills, spoon-shaped at the ends, associate in small flocks, and feed on shell-fish, insects, and worms. The Roseate Spoonbill is confined to the warm parts of America. It is about two feet six inches long. There are two foreign species.

SPRINGBOK: a species of antelope, of a yellowish brown color, two feet and a half high, remarkable for its prodigious leaps, when frightened. It is sometimes called the Springer.

SPRINGER: a lively and pleasing species of dog, very expert in raising woodcocks and snipes.

SQUIRREL: a genus of lively quadrupeds, living generally upon trees, sitting often upon their hind legs, and using their fore paws as hands. They gather nuts into the hollow of some old tree in summer, upon which they feed in winter. The Fox, Cat, Black and Gray Squirrels are the largest species in the United States. The latter is well known, and remarkable alike for beauty and activity. Its flesh is much esteemed, and great numbers are killed for the table. In the Western states they are abundant, and, with the Black Squirrels, often perform extensive migrations, like the lemmings. They may frequently be seen crossing the Ohio river, using their tails, as it is said, instead of sails. The Red Squirrel, or Chickaree, is a nimble, impertinent fellow, often seeming to laugh at you from a neighboring tree. The Striped or Chip Squirrel is very common in all our woods; instead of climbing trees, like the rest of his race, he burrows in the ground, where he spends the winter like a dormouse. There are still other species in this country, among the most remarkable of which is the Flying Squirrel. This has a membrane on each side, extending from the fore to the hind legs, which it spreads out, and glides down from the top of a tree, in a slanting direction, thus often passing over a hundred feet of ground at a single leap. Beside this species, another is found on the Rocky mountains. In foreign countries, there are various kinds of Squirrels, analogous to these we have described.

STAG, or Red Deer: this fine animal, formerly abundant in England, is now confined to the northern parts of Scotland, and the colder parts of Europe and Asia. It is considerably larger than the Fallow Deer, and is of a reddish brown color. The male has tall antlers, which, like every other species of Deer, he sheds annually. When he is six years old, he is called Hart. The female is destitute of horns, and when three years old is called Hind. Some of these animals may be seen domesticated in England. In the mountains of Scotland, large herds are found in a wild state.

STAR-FISH, or Sea Star: a genus of curious animals, known by the general name of Asterias. They are found along all shores, and are of various colors. Sometimes they appear like a mass of jelly floating on the surface of the water, but are more commonly found adhering to rocks in the form of a wheel, without the rim. One of the most common kinds has five rays, and is known by the name of Five-fingered Jack. The mouth is in the centre. The lower side of the rays is furnished with a multitude of feelers, called tentacula; these sometimes amount to four thousand in one fish. At night these creatures give forth a phosphoric light. They feed on worms and small shell-fish.

STARLING, or Stare: a genus of birds feeding on insects, which they find upon the ground. The Common Starling of Europe is eight inches long, of a brassy black color. He builds his nest in the holes of trees, under the tiles of roofs, and in the holes of walls. He assembles in flocks, and chatters like our blackbirds. He may be taught to whistle tunes and articulate words. There are several other foreign species; the only American one is our well-known Meadow Lark. Wilson erroneously supposed the Red-winged Blackbird to be of this genus.

STING RAY: see Ray.

STINT, or Purre: a species of European sandpiper, seven inches long, valued for the table.

STOAT: see Ermine.

STOCK-DOVE: see Pigeon.

STORK: a genus of birds, living in marshy places, and feeding on frogs, fishes, and birds. They migrate in large bodies, and are easily tamed. The Common Stork of Europe is white, and three feet six inches long. In Holland, it is familiar about the houses, often building upon the roof. It is never molested, and is thought to bring good luck to the dwelling upon which it lives. There are two or three other species, among which is the Marabou Stork, found in the warm parts of Africa. It has an immense bill, and is of great service in removing carrion. Its feathers are in great esteem for head-dresses.

STURGEON: this fish resembles the pike in appearance, but, unlike that fish, is pacific, and not voracious. It grows to a large size, sometimes weighing upwards of four hundred pounds. It frequents rivers in Europe and America. In this country it is not esteemed for the table; in England it forms a great article of food. The roe of the Sturgeon, prepared in a particular manner, is called caviar, and is much eaten in Europe.

SUCKER: a lazy, still fish, of a dingy color, found in our streams and rivulets. It fastens its mouth to a stone or root on the bottom, and basks in the hot sun for hours together. It grows to the length of eighteen inches.

SUCKING-FISH, or Remora: a fish from four inches to a foot long, sometimes found adhering to vessels and the bodies of sharks, by an oval spot upon the head, which acts upon the principle of the air-pump. The Indian Remora is two feet long. The ancients entertained an idea that this fish arrested the motion of vessels at sea.

SUN-FISH, or Diodon: a singular genus of fishes, some of them frequently growing to the weight of five hundred pounds, and others only attaining the size of eight to twelve inches. They are peculiarly formed, and are capable of inflating themselves with air, just as they come to the surface of the water. They are found on the coasts of Europe and America.

SURMULLET: a variety of the mackerel, formerly held in high esteem by the Romans. In Constantinople it is called Sultan Balik. It is often poisonous, and produces bad effects when eaten.

SWALLOW: this genus comprehends a great variety of species, all feeding upon insects, which they swallow upon the wing. They make extensive migrations, and fly with a rapid and long-continued flight, scarcely ever walking. Their voice is feeble and twittering, and their vision very perfect. They are sociable, building in families, and constructing their nests together in barns, chimneys, on the ground, or on the trees. They inhabit every region. The Purple Martin seeks out an abode near the dwellings of man, and is welcome wherever he goes for his familiar habits and cheerful and incessant chatter; he is about eight inches long, and is peculiar to America. The Barn Swallow is also an American species, building on the rafters of a barn or outhouse. It is about seven inches long. The Bank Swallow or Sand Martin is common in Europe, Africa, and America, burrowing in sandy cliffs in large parties, where it makes its nest of fine hay and loose feathers. It is of the same size as the preceding. The Common Chimney Swallow of Europe makes extensive migrations, and visits all parts of the old continent. Before its departure, it congregates in hundreds on houses and trees, and usually sets out in the night. There are several other species, both foreign and domestic. See Swift.

SWAN: this genus are among the largest of the aquatic birds, dwelling on the waters of rivers or lakes, swimming with ease and grace, and feeding on vegetables and aquatic animals, by putting their long necks down to the bottom. They build on the ground in secluded places near water. The species are few, but widely distributed. They seem to hold an intermediate character between geese and ducks. The Tame or Mute Swan is found wild in Russia and Siberia, and in many parts of Great Britain. It is often domesticated in England, and is greatly prized for its beauty and grace. It is of a pure white. The Wild or Whistling Swan has not the elegance of the preceding species; it frequents the sea-coast in the northern parts of both continents. It migrates in large flocks, and flies with ease and swiftness. It has a loud and shrill voice, uttering its notes more frequently on the approach of the spring. It was probably to this species that the ancients attributed the melodious song at death, as the Tame Swan was not known to them. It is about five feet long. The Black Swan is peculiar to New Holland. With the form of the Tame Swan, it is perfectly black, with a deep red bill. It is very shy, and flies off in a straight line when disturbed. Bewick's Swan frequents the coasts of the Arctic sea, and is about four feet seven inches long, of a pure white. The Trumpeter Swan is nearly six feet long, and is very common in our northern fur countries. It is remarkable for its voice, which is like a French horn, without its melody.

SWIFT: a genus of birds resembling the swallows, but living more in the air, and flying to a greater height. Their habits are nearly nocturnal. The Chimney Swift or Swallow of America occupies lofty chimneys and gigantic hollow trees. The noise which it makes in passing up and down the chimney, is like distant thunder. There are many foreign species. The Chimney Swallow of Europe belongs to the Swallow genus.

SWORD-FISH: a fish growing sometimes to twenty feet in length. The snout is three feet long, and is of a substance resembling coarse ivory. It has great strength, and is the mortal enemy of the whale, which it attacks whenever it gets the opportunity. It is found on the coasts of America and Europe. In the Mediterranean, it is much esteemed for food.

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TADPOLE: the young frog, after it is hatched from the egg. It resembles a fish with a large roundish head, and lives by sucking the juice of plants in the water. At the age of ninety-two days, its hind legs appear; in four days more it has teeth; in two days more its fore legs are formed. It is now a complete frog, except that it has a tail; this it gets rid of in about six hours, and ceasing to swim like a fish, it rises to the top, and seeks its food of worms and insects on the land.

TAILOR-BIRD: a curious bird of India, that forms its nest by sewing leaves together with hair.

TALPA: the Mole.

TAMANDUA: the Ant-eater.

TANAGER: a genus of American birds, chiefly confined to tropical regions. They are active, and live in small families, frequenting woods. They build in trees, feed on seeds, insects and berries. They fly briskly, and seldom alight on the ground. The Scarlet Tanager is about six inches and a half long, of a brilliant scarlet color, with a black tail. He is shy and unsocial, rarely approaches the habitations of man, but builds his nest in the forest on a horizontal branch. The Summer Red Bird is seven inches and a quarter long, of a rich vermilion color. In his habits he resembles the preceding bird. The Louisiana Tanager frequents the prairies and plains of Missouri, and is about six inches and a half long, of a yellow and black color.

TAPE-WORM: a genus of worms of which there are several species, all breeding in the intestines of the human body. The body is jointed in the form of a simple chain, and each joint has its own appropriate mouth, and other parts.

TAPIR: this quadruped resembles the hog in shape, but is much larger. It is of a brown color, and has a bristly mane, an inch and a half long. It feeds on vegetables. It has a long, flexible nose, answering to some extent the purpose of the elephant's trunk. It sleeps during the day in sequestered places, and goes forth at night in search of water-melons, gourds, and pasture. If taken young, it may be easily tamed, and then, like the hog, will feed on any thing. A full-grown Tapir will weigh eight hundred pounds. One species is found in S. America; another in Malacca. The bones of a fossil Tapir, equal in size to the largest elephant, have been found in France.

TARANTULA: a venomous spider of Italy, living generally in caves, with a body about the size of a chestnut.

TAUTOG: the Indian name for the Blackfish.

TEAL: see Duck.

TENCH: an European fresh-water fish, tenacious of life, sometimes growing to the length of two feet nine inches. It is much esteemed for food.

TERMITES: see Ant.

TERN, or Sea Swallow: a genus of birds living in flocks on the borders of the sea. Their flight is elevated and almost perpetual; they pursue their prey in circuits, and sometimes dart down upon it with such force as to plunge into the water. They feed on fish and young water-birds. They have sharp, shrill voices, and are met with on almost all sea-coasts. The species are very numerous both in Europe and America.

TERRAPIN: a species of tortoise, found in tide waters, used for making soup.

TERRIER: see Dog.

THRASHER: a vulgar name for our Brown Thrush.

THRASHER, or Fox Shark: this fish is from ten to fourteen feet in length; it is common on our coasts, and has the reputation of giving the whale an occasional flogging with his powerful tail. He is said to associate with the sword-fish, in attacking this monster of the deep.

THORNBACK: see Ray.

THROSTLE: the Common Thrush of Europe, generally of a reddish brown color, but varying much in plumage. It is a capital singer, and figures in song from the Death of Cock Robin, to Milton.

THRUSH: a genus of insectivorous birds, inhabiting woods, bushes, reeds, or orchards, most of them building solitary nests. They generally live in pairs when attending their young, migrate in large companies, or remain sedentary in warm climates. They live on insects, worms and berries, excel in song, are esteemed for the table, and do the husbandman infinite service by destroying grubs and insects. The foreign species are the Missel Thrush, Fieldfare, Throstle, Red-winged Thrush, Ring-ouzle, Blackbird, Blue Thrush, and some others. The principal species among us are the Mocking-bird, the Brown Thrush, or Thrasher, only inferior to the preceding in musical talent; the impertinent Catbird, the familiar Robin, the solitary and retiring Wood Thrush, the little Hermit Thrush, resembling the nightingale in color, and almost equal to it in song; Wilson's Thrush, Aquatic Thrush, and Oven Bird.

TIGER: a quadruped of the cat family, inferior only to the lion in strength, size, and courage. The body is long, the legs rather short, the eyes ghastly, and the countenance haggard, savage, and furious. He is the scourge of Asia and the Asiatic islands. He has strength to seize a man and carry him off at full gallop. His ferocity leads him to slay beyond his desire of food. In contrast to these hideous qualities, his skin is marked with singular beauty, being of a fawn color, splendidly striped downwards with black bands. His step resembles that of a cat; when taken young, and kindly treated, he grows familiar, and exhibits gentleness and affection towards his keeper. There is but one species, the Royal Tiger of Asia. The Black Tiger of S. America is a fierce animal of the size of the jaguar, and is but little known. It is supposed to be a variety of the jaguar.

TIGER CAT, or Cape Cat: a beautiful species of cat found in Southern Africa; it is about three times the size of a common cat, tall, slender and graceful, of a fawn color, spotted with black. Its countenance is mild, yet lively, and its motions exceedingly quick. The Tiger Cat of America is the Banded Lynx.

TITMOUSE : a genus of small birds, with short, strong bills, of an active, restless, peevish disposition. They are great enemies to insects, live in families, feeding on grain and fruits, and sometimes attack sickly birds, and devour the brain. They love quarrels; their flesh is no better than that of a crow, and their song no better than that of any noisy chatterer. The Tufted Titmouse, and the well-known Chickadee, or Black-capped Titmouse, are common in this country; the latter is known also in Europe. There are several other foreign species.

TOAD: a genus of reptiles, with thick, short, and broad bodies, covered with warts and excrescences; they have large eyes and no teeth. The Common Toad is found in gardens, woods, fields, cellars, and other obscure places. It passes the winter in holes, like the frog, in a state of torpidity. Astonishing stories have been told of this animal, which has sometimes been found living in wood or even stone, completely shut out from the open air, where it has probably dwelt for centuries. Disgusting as it is to the eye, it is perfectly harmless, and has sometimes been tamed, and made a pet of by the ladies. It lives to a great age, and feeds on insects in the manner of the ant-eater, by darting out its tongue, covered with a glutinous substance, at its prey. The Pipa or Surinam Toad is extremely disgusting in appearance, notwithstanding which the negroes called, beside Towwee Finch and Ground Robin—Towwee Bunting, Chewink, and Peewink. It is found in nearly all parts of N. America; it builds upon the ground, and shows great solicitude for its young. It is eight inches long, black above and white beneath.

TROPIC BIRD: a bird well known to the navigators of the South seas, of a roseate color, with black legs and bill, about two feet ten inches long.

TROUT: of this fish there are several species; the Sea or Salmon Trout is found in waters communicating with the ocean; it is a foot and a half long, has red flesh, and is highly esteemed for the table. It is abundant in some of our northern lakes. The Common Trout is from twelve to eighteen inches long, and is common in rivers and lakes in Europe and America. It is of different sizes and colors, in different situations. The taking of this sly fish is pursued with great science by many sportsmen.

TRUMPETER BIRD: a beautiful bird found in S. America; the general color is black, with long, pendulous and silky feathers on the shoulders. It is twenty-two inches in length.

TRUNK-FISH: a genus of fish, covered with osseous plates, except on the fins and mouth. They are found in Indian and S. American seas, and are from four to twelve inches long. A few specimens have been cast on our shores during storms, so that they probably exist in northern latitudes.

TUNNY: a fish sometimes about ten feet long, though on our shores it does not exceed two. It pursues the mackerel, which it devours voraciously. It was well known to the ancients, and appeared then, as now, in immense shoals. The fleet of Alexander the Great is said to have been impeded in its progress by a compact mass of these fish. In the Mediterranean they form a great article of food.

TURBOT: a flat fish, highly esteemed for the table, about two feet long, and resembling the flounder. In England, it is more valued than any other fish, and the fishery is exceedingly profitable. The Turbot is scarce on our coasts, but is occasionally taken near Cape Cod.

TURKEY: this well-known inmate of the poultry-yard was first found in America, and though scarce in New England in a wild state, is still met with in large flocks in the Western woods. Wild Turkies are common in the markets of Cincinnati, and other cities of the West; the flesh is not better, however, than that of the tame bird. In its savage state, it is a cowardly, strutting coxcomb, as in a more civilized condition. It feeds on ants, seeds, and berries. Sometimes a flock has occasion to make a journey, in the course of which they come to a river. They assemble on the bank, and hold a sort of congress, when the cocks strut about, bluster, grow red in the gills, and make long speeches. After a great deal of fuss, they set out to fly across; some fall in the water, but usually they contrive to swim ashore. The females, being no politicians, have little to say on public occasions.

TURKEY BUZZARD: this Vulture is abundant in America, preferring warm to cold regions. In tropical countries, it is protected by law for its services as a scavenger, as it freely devours filth, carrion, and rubbish of all descriptions. As if aware of the protection afforded it, this bird is often seen in the streets of our Southern cities, following the scavenger's cart. It is fond of warmth, and will sometimes pass the night upon the roof of a house, to enjoy the heat issuing from the chimney. It is about two feet and a half in length, of a brownish black color. It builds in swamps. It is often associated with the Black or Carrion Vulture.

TURNSTONE: a bird resembling the sandpiper; it derives its name from its habit of turning over stones with its bill in quest of insects. It is the only species of the genus, and is common to all parts of the sea-coast. It breeds in the inclement regions of the north. It is about ten inches and a half long, varied with black, white, and red.

TURTLE: another name for Tortoise.

TURTLE-DOVE: see Pigeon.

U.

URSON: the Canada Porcupine.

URUS, or Aurochs: the Wild Bull of Europe.

V.

VAMPIRE: see Bat.

VANSIRE: a species of weasel, found in Madagascar.

VICUNA: a quadruped resembling the lama, found in S. America. Its fur is woolly and fine, of a fawn color above, and white below.

VIPER: a well-known poisonous genus of serpents, of which there are many species, seldom exceeding two feet in length. The Common European Viper feeds on frogs, lizards, birds, and mice, but is capable of long abstinence, sometimes going without food for six months. Its bite is very poisonous, and makes the creature much dreaded. The Egyptian Viper, supposed to be the Asp of Cleopatra, is very abundant and poisonous. The Water Viper is found in Carolina, and is very large, powerful, and venomous. The Horned Viper, or Cerastes, is distinguished by a pair of horns above the eyes. It abounds in Arabia and Africa. There are several other species.

VIRGINIA DEER: see Deer.

VULTURE: a genus of gregarious birds, generally found in warm and mild climates, where they feed on carrion, small animals, birds, and reptiles. They are indolent, have disgusting forms, bad odor, and heavy movements. The neck is bare of feathers, and the head small. The principal American species are the Condor, Californian Vulture, King Vulture, Turkey Buzzard, and the Black or Carrion Vulture. The two latter are the only species in the U. States. The King Vulture is a fine bird, found in the warm parts of America. It is of a reddish white color, with black wings and tail. The Californian Vulture is black, and nearly as large as the Condor. The Black Vulture associates with the Turkey Buzzard; is more familiar, and rather smaller. It is quite black, and very gregarious, assembling sometimes to the number of two hundred, around a dead carcass. Among the foreign species are the Golden Vulture, the Griffin Vulture, and Sociable Vulture. This race of birds, though offensive to the eye, are of the greatest use in hot countries, in devouring putrefying masses of flesh, which would otherwise spread pestilence far and wide. The keenness of their sight enables them to mark a dead carcass at the distance of many miles: travellers in Africa relate, that if a wild animal is killed, the Vultures, soaring beyond the reach of human vision, see it, and come hurrying from every point of the compass, to partake of the meal.

W.

WAGTAIL: a genus of European birds, with very long tails, which are continually in motion. They frequent the brinks of rivers, ponds, and small pools. The French call them Lavandières, from their frequenting streams where the women are washing.

WALKING LEAF: a remarkable insect found in China, of a beautiful green color, which soon fades and resembles a dead leaf. Its neck is longer than its body, and it has six jointed legs.

WALRUS, Morse, Sea Horse, or Sea Cow, somewhat resembles the seals, and often associates with them. It is twelve feet in length, and weighs twice as much as the largest ox. It has two large ivory tusks, weighing from ten to thirty pounds each, on each side of the upper jaw; the body is covered with short hair. It is rarely found, except in the Northern seas. It sometimes lies upon the ice in herds of many hundreds, making a loud, roaring noise. When fired at, it tumbles over into the sea. The female will defend her offspring at the expense of her own life, and the young one will never quit the body of its dam. The Walrus is taken for its oil, of which it yields a large quantity.

WAPITI, American Elk, or Canada Stag: a fine species of American Deer, found in the northern and western regions. In size, it is between the Moose and the European Stag. The male has large branching horns, sometimes six feet in length. Its flesh is highly esteemed, and of its hide, many articles of dress are made by the Indians. It is shy and retiring, loving to dwell in the deepest solitudes of the forests. Its senses are very acute, and it is not easily approached by man.

WARBLER: a numerous genus of small birds, diffused over the whole world; most of them are remarkable for activity and musical powers. They generally live in forests or thickets, and feed on insects and berries. The most remarkable species are the Nightingale, Robin Redbreast, Reed Warbler, and Black-cap Warbler, of Europe; and the Myrtle Bird, Summer Yellow-bird, and Black-throated Green Warbler of this country. There are a multitude of other species.

WASP: a genus of fierce insects, furnished with poisonous stings. The Wasp differs from the bee in having a larger body, with yellow circles around it, and in being quicker in its flight. It associates in swarms, often of ten or twelve thousands, making its nest usually on the ground. The swarm is divided, like the bees, into workers, drones, and queens; of the latter, however, there are several hundreds. The habitation is made with skill, and consists of several stories; the different species, however, have different habits and different modes of building. They are great robbers, often taking honey from the bees; they feed on this, and also on the juice of fruits and plants, and on animal substances.

WATER HEN: see Gallinule.

WATER RAT: see Rat.

WATIRIWAOU: the smaller species of ant-eater.

WEAKFISH, or Squeteague: a rare fish, caught on the shores of Massachusetts, about twelve inches in length, valued for the table.

WEASEL: this term is often used as embracing an extensive family, consisting of the Polecat, Ferret, Mink, Marten, Sable, Pekan, and Fisher. They all resemble in form the proper Weasel, which is a small quadruped, about seven inches long, with a slender body, and remarkably short legs, fitting it to creep into small holes. It is a quick, vigilant, voracious little beast, living on birds, mice, squirrels, and eggs. It is often a great pest in the poultry-yard. It is common to Europe and America; in winter, it becomes white, and is then called Ermine, or Stoat.

WEAVER: a genus of birds, about five inches in length, chiefly found in Africa, remarkable for the elaborate skill with which they weave their nests. The Abyssinian Weaver builds its nest in the form of a pyramid, with a hole in the side facing the east. The nest of the Sociable Weaver has been described under the head of Birds.

WHALE: the elephant of the deep, not only surpassing all other fishes in size, but all other animals. There are several species, as the Greenland Whale, Iceland Whale, New England Whale, &c. The first named is that which is most sought for by the whaler. It grows from forty to eighty feet in length: the head making nearly one-third of its bulk. The mouth is so large as to admit a coach and horses; the tongue, consisting of fat, resembles a large feather-bed. The skin is black and thick; between this and the flesh is the blubber, or fat, which is cut in strips by the whalemen, and afterwards reduced to oil by boiling. The female brings forth one at a time, which she suckles, and takes care of with great solicitude and affection. One Whale is about as large as a hundred elephants. Its strength is prodigious, yet the fishermen kill it by striking into it a kind of spear called a harpoon, to which a long rope is attached. Instead of teeth, the Whale has several hundred layers of whalebone attached to its jaws, through which it sucks its food, consisting chiefly of small black sea insects, called Medusa. Its only weapon of defencê is the tail. The Spermaceti Whale is described under Cachelot.

WHEATEAR: an European bird resembling the Warblers, six inches in length. It lives in woods, and is distinguished by keeping its tail constantly in motion.

WHIMBREL: a species of Curlew.

WHINCHAT: a species of European Warbler.

WHIP-POOR-WILL: a species of American Goat-sucker, remarkable for its wild, thrilling song, consisting of a rapid utterance of the word *whip-poor-will.* The song commences at evening, usually in some solitary wood, and is prolonged throughout the night. The bird is nine inches and a half long, variegated with black, white, and rust color. Its mouth is remarkably wide. It feeds on moths and insects at night, and lays its eggs amid the leaves, or on a rock, in some sequestered spot in the forest. It is a harmless bird, and seldom seen, but its nocturnal habits and melancholy music have connected with it many superstitious notions.

WHITE BAIT; a small fish found, it is believed, only in the Thames. Parties from London often go to Greenwich to feast upon it.

WHITING: a small sea fish, from six to twelve inches long, found in Europe and America. In England, the Whiting fishery is of great importance. When dried, these fish are called Spauldings.

WIDGEON: see Duck.

WOLF: a fierce and savage beast, greatly resembling the dog, and of the size of the largest kinds. It hunts in packs, pursuing and slaying sheep, lambs, deer, and such other quadrupeds as it can master. When pressed by hunger, it attacks man with ferocious courage. If taken young, it becomes tame, and instances have been known of its showing attachment equal to that of the dog.

The Common Wolf is of a brownish gray color. It is extirpated in England, but is often met with in France, and all the northern countries of Europe, particularly in mountainous districts. In America, a species resembling this was found by the first settlers, occupying the whole northern part of the continent. It has gradually retired, and is now scarce, except in the western regions. The Black Wolf and the White Wolf inhabit the northern part of the continent; the Prairie Wolf is found in the valley of the Mississippi. These, and some others, are considered varieties of the Common Wolf, proceeding from the influence of climate.

WOLVERENE: supposed to be the same as the Glutton.

WOMBACH: a quadruped found in New South Wales, resembling the badger. It has many of the habits of the bear, but does not appear to be carnivorous. It is of a light brown color, sprinkled with black. The female is furnished with a pouch for her young.

WOODCOCK: a bird somewhat resembling a snipe, about the size of a pigeon, with a bill three inches long. Its back is mottled with black and brown. It flaps its wings in rising, with some noise, flies rapidly for a short distance, and then descends suddenly like a falling stone. It feeds on worms and insects, which it draws out of the mud. Its flesh is universally admired. It breeds in northern regions during summer, but migrates southward at the commencement of frost. It is a nocturnal bird, feeding chiefly at night. The American Woodcock greatly resembles the preceding European species in form and habits, but it is less in size, and is differently marked.

WOODPECKER: an extensive genus of strong, hard-working birds, which may often be heard in the forest, pounding upon the decayed trees, like so many carpenters. They are furnished with strong claws, by means of which they climb up and down the trees, assisted by the strong feathers of their tails. They feed in summer upon the larvæ of insects, which they pick out from the bark of trees. In winter, they help out their meals with berries. Their bill is long and strong, and answers the purpose of a chisel, by which they dig themselves holes in the decayed branches of trees. The species best known in this country are the Red-headed Woodpecker, which is a great thief in cherry time; and the Golden-winged Woodpecker, splendidly marked, familiar in our orchards, and passing under the various names of Flicker, High-hole, and High-pole; among our other species are the Pileated, Hairy, Ivory-billed, and Downy Woodpeckers. There are many foreign species.

WOOD-THRUSH: a species of Thrush.

WORM, or Earth Worm: a well-known creature, found in the earth, trailing itself along by means of a spiral muscle round its body. It delights in moist, rich soil, upon which it feeds; it breathes through holes along its back; it is destitute of brains, bones, feet, eyes, and ears. It lays eggs, which are hatched in twelve or fourteen days, and lives to the age of two or three years. There are several other species of worms, some living in animals, and in other situations.

WRASSE: there are several species of European sea fish of this name; the most common of which is the Old-Wife, found in deep waters, and feeding upon shell-fish.

WREN: of this bird, the most common species is the House Wren, a familiar little fellow, full of cheerful song, making his nest under the eaves, in the corner of a shed, or in an old hat, if you will nail it up for him. He feeds on insects and larvæ, and thus kills many enemies of the gardener. He is given to quarrelling, and fights every bird that intrudes upon his domain. This species seem to be the same as the Common Wren of Europe. There are several others, foreign and domestic.

WRYNECK: an European bird, resembling the Woodpeckers, with a tongue long enough to wind around its neck. It extracts insects from the crevices in the bark of trees, and also pillages the ant-hill of its inhabitants.

Y.

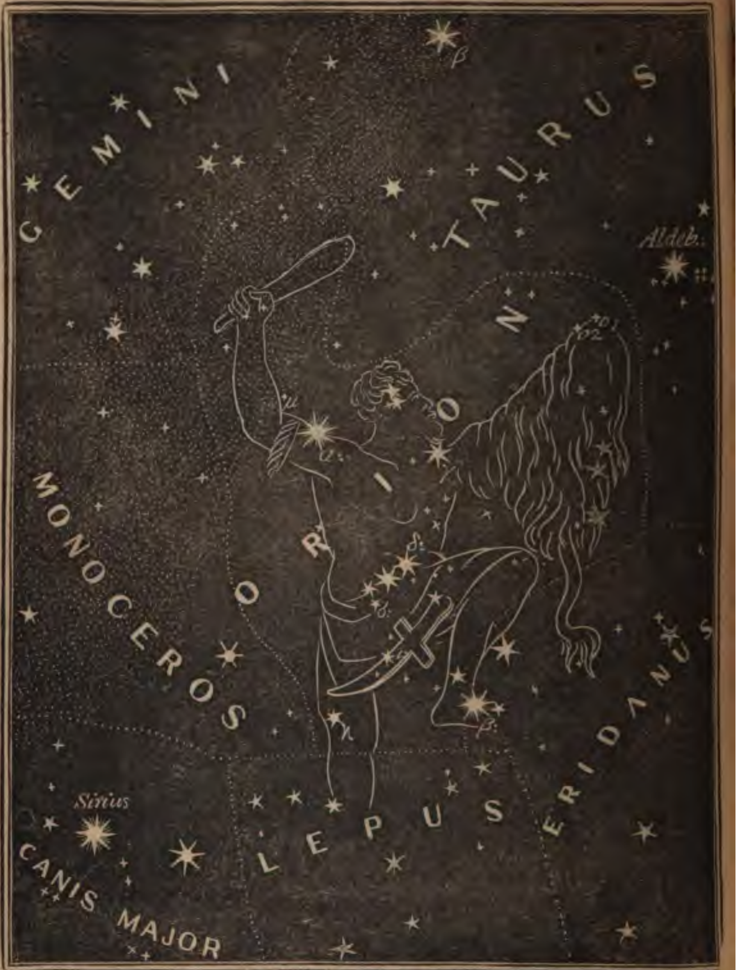
YAK: a large animal of the ox kind, somewhat resembling our bison; but it has larger horns, and a tail like a horse. The hunch on the shoulders is large, and covered with long hair. It is an inhabitant of Thibet, where it lives in wild herds amid the mountains: it is also domesticated, and used for draught and burden. It is often employed to go upon considerable journeys.

Z.

ZEORA: of this beautiful animal, found in Southern Africa, there are two species; the Zebra, and the Zebra of the Plains. They closely resemble each other. The former is called the Dauw, or Pard. These animals are in size between the horse and ass: they are white, striped with regular bands of fawnish black. In a wild state, they roam in herds, are exceedingly shy and watchful, and fly from pursuit with the fleetness of deer. Several of them have been recently taken by our enterprising countryman Macomber, and exhibited throughout the U. States.

ZEBU: the Indian Ox.

ZOOPHYTES: see Polypi.



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ASTRONOMY.

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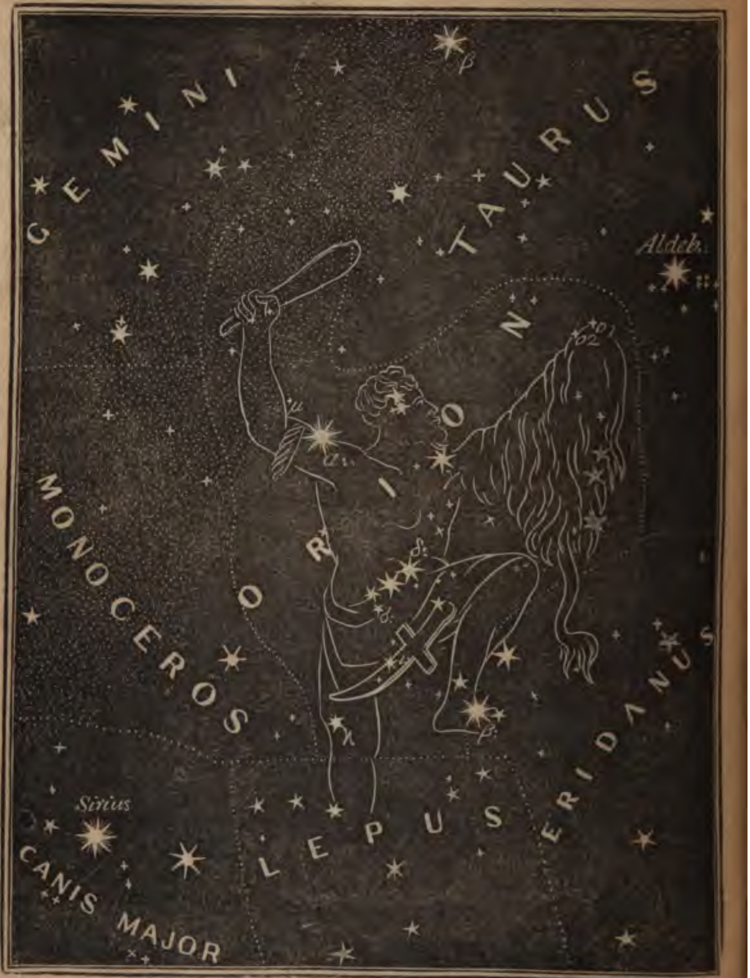

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INTRODUCTION.

By Astronomy, we mean the science of the heavenly bodies, including also the earth on which we dwell. It is a subject full of wonders, and will well repay us for looking into its mysteries.

"Let us go to the hills yonder, where the clouds are, and see what is beyond"—said one boy to another. This was a very natural plan, but it would only show other clouds and other hills in the distance. The little traveller, after a weary search, must at length return home, with the belief that the world is an endless succession of hills and valleys.

But if the earth seems to the youthful mind a mystery, the blue sky with its sun by day, and its moon and stars by night, is still more wonderful, and more mysterious. Yet all these things, so incomprehensible at first, are capable of being understood, and I hope this volume may enable the patient reader to know the forms and motions of the heavenly bodies, and the paths in which they seem to travel, as well as he knows the shapes of animals that inhabit the earth, or the roads that lead from one town to another. This may seem a difficult study to the beginner, but it will soon become easy, and the learner will never regret the pains he has taken in mastering so great and so interesting a subject. I hope he will listen to a few words of introduction, before he proceeds.

The earth seems extended in every direction until it meets the sky, where the intersection forms a circular line which is called the visible or sensible horizon; and this, to the uninstructed, seems the extreme limit of the earth. It seems as if, by ascending the distant hills apparently built against the sky, we might stand upon the edge of the world. As we ascend a mountain however, we find that our visible world enlarges; new hills and a new horizon rise to our view; and here the idea may perhaps first present itself, that the earth has no limit. We become further confirmed in this opinion by journeying in any direction; and find that from any particular point we see but one portion of the earth, its extent depending on our elevation. As we proceed, this portion gradually sinks below the horizon, and another comes into view, subject to the same general circumstances of extent and limitation. If we thus journey on in the same direction, say westerly, exploring new successive portions of the earth, and leaving those we have passed, constantly sinking in our rear, and at last, find ourselves situated in the same visible portion from whence we set out, with the same western hills before us, what must be the form of the earth—a cylinder?—we have found no limit, no edge, or end—and yet, in one direction, we have explored every part. Suppose we take another course, say south, and with a similar endless journey, find the same general changes in succession, and the same final result; what then would be its form?—not an immense plain, or a cylinder; there is but one form which could allow of our exploring the earth in this manner, in every possible direction, without finding some limiting edge, or horizon, where we should find ourselves in actual contact with the starry sphere, or on the verge of an abyss of space, where further progress would be impossible; yet every part has been thus traversed, every nook and corner explored, leaving no possible room for doubt, as to the general figure of the earth, or of its magnitude.

Above the earth, and on every side, is the sky, as a canopy; and apparently situated in this, are the sun, moon, and stars; the whole appearing to turn over from east to west, appearing as the inner side of a vast spherical shell revolving about the earth once a day. The most prominent object, and as will be seen, the most important, which here presents itself, is the sun, rising in the east, and by a revolution which is at once seen to be universal with every thing external to the earth, passing over it, and sinking beneath the horizon in the west; continuing its circular course, similar to our journey about the earth, it arrives again at the eastern horizon, to renew the day and continue its constant journey; from year to year, alternately waking the world to the activity, toil, and bustle of day, and leaving it to the quiet and repose of night.

As we find that day is the constant attendant of the sun, and that night always immediately follows its disappearance, we are led to consider it the immediate source of light, or at least so much of it as distinguishes day from night. Astronomy will show that it is the source of all, if we except the stars, not only of its own, so immediately apparent, but of the moon itself. Some of the ancients thought the sun useless because it shone only during the day; we can hardly conceive a state of such ignorance as could not discover that daylight is entirely dependent on the sun's presence.

As the sun is to us the great source of light, so it is of heat, as we find by exposing ourselves to its rays, or considering the phenomena of the seasons, and its effect on the vegetable creation. Besides its constant motion westward, as seen daily, we find that it has another which may be called annual or yearly, a slower motion north and south; that at one period of the year, it approaches from the south towards the point over our heads, and having arrived a certain distance north, it recedes again to a certain point south. We also find that the seasons have a close connection with this motion, and depend entirely on it.

When away to the south, the sun's rays reaching us more obliquely, we feel its effects but partially, the temperature is low, and this is the season of winter, a season of general repose to the year, and of torpid rest to the vegetable, and great part of the animal creation. Even the higher order of animals, and in general man himself, find in this season some relaxation from the arduous toils and business of life. From the largest tree down to the smallest herb, the progress of growth and development is suspended; not a leaf or a flower is now found to adorn the landscape, and the fields and woods present a dreary waste, well calculated to teach us our dependence on that luminary, whose temporary absence produces such an appearance of general inactivity and torpor. The whole insect and reptile race, and many animals, as the mole and the bat, poses of the season being now fulfilled, it gradually gives place to winter. With the retiring sun, our summer birds leave us for other climes, and other seasons, where the same great work of reanimation and reproduction is about commencing.

In all this, the sun is the vast and comparatively sole agent of the Creator, in continuing the great business of life, not only as regards the earth, but most probably, as will be seen by and by, of other worlds.

After the sun, the moon is the next most prominent object in the heavens, and the most beautiful. In all its forms, from the crescent to the full orb, and from the full to the crescent, it is always an object of admiration. A very little observation of this luminary shows us that its daily motion through the heavens is slower than that of any other celestial body; that its appearance is later at each successive rising; so that in about a month, it loses an entire day, giving the first example of a freedom of motion in the heavenly bodies, in a manner independent of each other, and entirely so of the great sphere in which they seem placed. Regarding the earth as fixed, with the sphere constantly moving over and about it from east to west, the moon is seen to have a constant motion eastward, by which it leaves the sun to the westward from the change to the full, and approaches it from full and passes it, sometimes above, sometimes below, and at others directly between it and the earth, at change.

Other bodies also present themselves in the heavens having a similar but slower motion. The planet Jupiter may be seen to move slowly eastward on the sphere, passing through an entire circle of it in about twelve years, as also the planet Saturn in about thirty, and Uranus in eighty-four years. The most brilliant of all the planets, is Venus, which is sometimes seen in the west after the sun is set, and is then called the Evening star. At other times it may be seen in the east before sunrise, and is then called the Morning star. It is never seen beyond a certain distance from the sun, and consequently, only in the evening or morning. The case is similar with the planet Murcury, which is limited to a still less distance from the sun, being seldom so far from it as to allow of its being seen. These bodies are called planets on account of the motion here spoken of, which distinguishes them from the stars, which preserve their same relative distances from each other, on which account they have been called fixed stars.

These seem to cover the whole surface of the great sphere we have spoken of. No words—not even such as diamonds, and sparkling gems, can convey to the imagination the most faint and distant idea of the beauty and magnificence of the heavens, when, in the absence of the sun and moon, they are lit up only by these minute but splendid points. We shall see in the course of the following pages, that the abodes of the stars are to be considered the true sphere, while the sun, moon, and planets are within it, and at immeasurable distances from it.

Considering the diurnal revolution of the sun as making our day, this whole sphere appears to revolve above and about us, with an even and constant motion, somewhat quicker than that of the sun in its daily course, the whole seeming to move forward a little, so that any particular part rises and sets somewhat earlier each succeeding evening, gaining in a year a complete day. It may seem improbable that one part of this sphere, with its thousands of stars, is above us in the daytime, because we cannot see them. It is the overpowering brilliancy of the sun, that makes them invisible; the telescope shows stars in the heavens during the day as well as night. If you place a lighted candle in a window where the sun shines on it, you will hardly be able to see the flame; and, though by considering its situation, you know the new moon to be above the horizon, yet you cannot see it until after sunset. You may obtain a better illustration, by rising early a few mornings before the change, when you may see the old moon gradually disappear on the approach of the new.

A considerable portion of the following pages will be found devoted to the study of the positions of the stars. The names only of the principal ones are given, as the use of proper maps is necessary for learning all. This part of astronomy will be found very interesting and useful; for in this way we become acquainted with every part of the great field on which the sun, moon, and planets perform all their evolutions, so that we may trace them through all their movements, and when for a period they become invisible, we can then know where to look for their appearance.

It is these bodies, these motions, and the laws by which they are regulated and governed, that astronomy has to deal with. The whole forms a mighty machine, the different parts, connection, and movements of which, it is the business of the science to trace out and explain. And though this little book can give you but a slight introduction to the subject, yet it may direct you in the proper course for becoming more thoroughly acquainted with it hereafter. One thing you will never lose sight of, and that is, the dependence of the whole on some great power, some Creator. I cannot suppose you will constantly inquire what these things are, what their magnitudes and several conditions, without also inquiring who is the great Architect that contrived and spoke the whole into existence.

P. P.

A DICTIONARY OF ASTRONOMY.

ACHARNES: the name of a star of the first magnitude, in the northern extremity of the constellation Eridanus. It is designated on maps by the Greek letter *a*. It is never above the horizon to the United States.*

ACHUBENS: a star of the third magnitude in the constellation Cancer. It comes to the meridian at nine o'clock in the evening of the 16th of March. See Cancer.

AEROLITES: this is a name given to those ore-like, or metallic and stony substances which have occasionally fallen from the upper regions to the earth. They are generally seen like irregular masses of fire to descend with great velocity in an oblique direction, and when near the earth to explode with great violence. Their appearance is sometimes very splendid, and awfully grand, seeming to impress the beholder with the idea that some celestial body is being suddenly precipitated to the earth. The traveller, pursuing his journey by night is startled with a light which renders surrounding objects visible as at noonday, and looking up, he beholds a dazzling flame drawn across the sky, which sometimes instantly reaches the horizon, leaving behind it the impression of a long track of milky light, which is generally accounted for, by supposing it the effect of the impression made on the eye by the original blaze. Sometimes when seen at greater heights, or from greater distances, they appear to move slower, and may be followed by the eye as we trace the course of a rocket, producing something of a similar effect, leaving a sparkling train behind them. After this, among notices of the phenomena from various parts of the country, we sometimes find accounts of meteoric stones having fallen from a great height ploughing up, and burying themselves in the ground.

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* When in the course of reading this book, you find astronomical terms with which you are unacquainted, you must learn their definition from the proper source in other parts of the book. Thus in the first article you find the words, magnitude, constellation and horizon, which you may find explained under these heads.

A phenomenon of this kind occurred a few years since, which I think was seen throughout the whole extent of the United States. It precipitated a considerable mass of stones in scattered fragments, in the state of Connecticut. Some of them when found, were still warm.

Where these masses come from, has not been satisfactorily ascertained. Some suppose them to be concretions formed in the atmosphere; others account for their appearance by considering them fragments of the planet, which originally formed the asteroides; others suppose them volcanic stones thrown from the moon, while others suppose them to be thrown from the volcanoes of the earth.

All these suppositions may be liable to objections, though the lunar theory presents perhaps the least. The science of chemistry does not afford any plausible argument in favor of the rapid accumulation of these masses in our atmosphere, while the depths to which they have been known to bury themselves in the earth, would seem to prove them to have fallen from a height far beyond its limits. The idea that they may be planetary, or lunar volcanic substances, is objected to, on account of its extravagance. It may be proved however, in support of the lunar theory, that heavy bodies thrown from the moon towards the earth, with a velocity about four times that of a cannon ball, (a force no way surprising when we consider the violence of terrestrial volcanoes,) that they would be carried beyond the centre of attraction, between the earth and moon, and would fall to the earth, performing the journey in about four days. As for the notion of their being thrown from terrestrial volcanoes, it may be stated that no stones or ores like these have ever been found in the earth, excepting those that have evidently fallen from above it. From all this you will easily see which opinion we are inclined to adopt; yet I would not have you consider this of too much consequence, as it is one of those subjects better adapted to speculation, than any thing else. When you are old enough, you must endeavor to form your own opinion, with such means, and from such sources as may then be in your reach. By that time perhaps, the nature and origin of aerolites or aeroliths may be better understood.

ALCYGONE: the largest star of the Pleiades.

AIR: the atmosphere. This word I need not define, yet it is entitled to consideration on account of its effect on light, which is called refraction. By means of this property of the atmosphere, all celestial bodies, excepting those in the zenith, appear higher than they really are.

ALDEBARAN: a star of the first magnitude in the constellation Taurus. It comes to the meridian at 9, Jan. 10. It may be readily found by looking for it southeast of Pleiades at the distance of about 15°. This is an important star in nautical astronomy, as the distance of the moon from it determines the longitude at sea. See Orion.

ALDERAMIN: a star of the second magnitude in the constellation Cepheus. To the United States, this star never sets. It comes to the meridian above the pole at 6, in the evening of Dec. 13, and to the meridian beneath the pole at 6, the next morning. Its distance from the pole is about 28°. See Cepheus.

ALGENEB: a star of the second magnitude in the constellation Pegasus. See Pegasus.

ALGOL: a remarkable periodical star in the constellation Perseus. It comes to the meridian at 9, Jan. 17. See Perseus.

ALGOREB: a star of the third magnitude in the constellation Corvus. See Corvus.

ALIOTH: a star of the third magnitude in the constellation Ursa Major. See Ursa Major.

ALKES: a star of the fourth magnitude in the constellation Crater. See Crater.

ALMACH: a star of the third magnitude in the constellation Andromeda. It comes to the meridian at 9, Dec. 27, at which time it is very near the zenith, and may be easily known. See Andromeda.

ALPHARD: a star of the second magnitude in the constellation Hydra. See Hydra.

ALPHERAT: a double star of the first magnitude in the constellation Andromeda. This star is situated very near the equinoctial colure, which is a great circle of the heavens, which you should immediately get acquainted with. It comes to the meridian at 9, Nov. 10, at which time it is about 20° south of the zenith. It is a large star, and there being no other star near it of equal magnitude, you will easily find it. If now you imagine a line drawn from the north point of the horizon through the pole star, then south through Alpherat to the south point of the horizon, carefully noting the stars near which it passes, you will have very nearly the position of that half of the circle at this time above the horizon. This is a favorable time for looking for a star of the second magnitude in the constellation Phœnix, which under favorable circumstances may be seen near the southern horizon about 9° east of the equinoctial colure. See Andromeda.

ALPHETA: a star of the second magnitude in the constellation Corona Borealis. It comes to the meridian at 9, June 28. See Serpens.

ALTITUDE: of a celestial body is its height, or distance from the horizon. This distance is estimated in degrees and parts of a degree. You will find directions for estimating distances in this manner in the article Degree.

ANDROMEDA: a constellation situated northwest of Aries and south of Cassiopea. It is represented on maps by the figure of a woman. When Alpherat comes to the meridian, which is at 9, Nov. 10, you will see to the northeast of it at the distance of 14° a star of the second magnitude. This is Mirach a double star. This part of the constellation is represented on the picture of Pisces. Alpherat is the only star of the first magnitude in this neighbourhood. About 14° south of it, is Algeneb a star of the second magnitude in the constellation Pegasus. West of this, distant about 16°, is Markab, also of the second magnitude in the same constellation. North of this, distant about 13° is Scheat in the same, also of the second magnitude. This star is nearly west of Alpherat, and about 16° distant from it; the four forming nearly a square, of which Alpherat is the northeast corner. Northwest of Mirach distant about 4° is a star of the fourth magnitude and nearly north of this is another of the same. About 1° west of this, is a remarkable nebulous spot described in article Nebula. The collection of bright stars about 20° north of this, forms the beautiful constellation Cassiopea. Part of Andromeda is represented in the sketch with Pisces.

According to fabulous history, Andromeda was daughter of Cepheus and Cassiopea king and queen of Ethiopia. Cassiopea boasted herself fairer than Juno or the sea-nymphs, which so enraged Neptune, that nothing would appease him short of exposing her daughter to being devoured by a sea-monster. Accordingly Andromeda was chained naked to a rock, but just as the monster was about to devour her, Perseus who was returning from his perilous enterprise, with the bloody head of Medusa, saw her, and was captivated by her beauty. He changed the monster to stone by showing him Medusa's head, then liberated Andromeda, and afterwards married her. Pliny says the rock to which she was chained was at Joppa, in Judea, and that the monster's skeleton was brought to Rome and long preserved there. At Andromeda's death, Minerva placed her as a constellation in the heavens.

ANNUAL: in astronomy any thing which relates to the year, or which returns yearly.

ANNULAR ECLIPSE: see Eclipse.

ANTARCTIC CIRCLE: a circle about the south pole of the earth as a centre, distant from it 23° 28′. At this circle, the sun does not set during the longest day of Summer, but continues above the horizon the whole twenty-four hours. Still farther south, the Summer sun continues longer above the horizon; until at the pole, it is constant day for the period of six months. This season of constant day at the south pole commences September 23, and ends March 21, when a night of equal length begins. See Earth.

ANTARES: a star of the first magnitude in the constellation Scorpius. See Scorpius.

ANTIPODES: the inhabitants of two places on the earth which are situated diametrically opposite each other; that is having a diameter of the earth between them. Thus the inhabitants of the United States and those of New Holland are antipodes to each other. To places thus situated, it is noon or mid-day at one, when it is midnight at the other.

APHELION: that point in the orbit of a planet which is farthest from the sun. The orbits of the planets are not perfect circles, but more or less elliptical. An ellipse is a curve which differs from a circle by being described about two centres instead of one. The sun occupies one of these centres, and that point in the orbit nearest it is called the perihelion point, and that nearest the other centre, is called the aphelion point.

APIS MUSCA: a small

southern constellation of four stars, never seen from the United States.

APOGEE: of a celestial body is its greatest distance from the earth. This word is frequently met with in almanacs, and is used with regard to the moon. See Moon.

APPARENT: This word is used in astronomy to signify the size, place, or distance of celestial bodies as they appear to us, and which can never be considered as real. The apparent size of the sun, moon, planets or stars for instance, can give us no conception of their real magnitudes. Many of these objects appear as mere points, yet are many times larger than the earth. Their distances, however great they may appear, are infinitely beyond our most extravagant conceptions. The planet Venus may pass between us and the sun, appearing as a small black spot on the sun's disc, yet its distance from it is many millions of miles. Planets may appear to move backwards in their orbits which can never be the case. In short, there is nothing in the whole range of astronomy, that does not require the correcting hand of science to enable us to draw proper conclusions as to distance, place or magnitude.

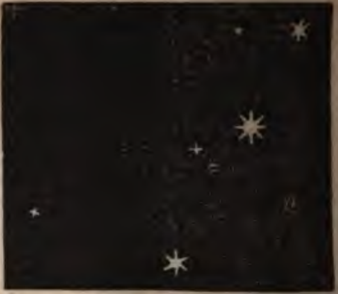
APRIL: the fourth month of the year. On the 20th of this month, the sun enters the sign Taurus. During this month, the constellations Leo, Hydra and Ursa Major come to the meridian at nine in the evening.

APUS: a small constellation near the south pole, consequently never seen from the United States.

AQUARIUS: the Water Bearer, a constellation of the zodiac, situated between Capricornus and Pisces. At 9, October 22, you may see a star of the first magnitude on the meridian near the horizon. This is Fomalhaut in the head of Pisces Australis. North of this, distant about 13° is a star of the third magnitude in the right leg of Aquarius; 15° northwest of this is a star of the third magnitude in the right shoulder of Aquarius, and about 12° southwest of this is another of the third magnitude in his left. Between this and the star mentioned north of Fomalhaut and rather nearest the latter, is the present position of the planet Uranus, which appears like a faint star of the sixth magnitude. The star of the third magnitude about 19° northwest of Fomalhaut is Deneb Algedi in the constellation Capricornus. About 8° north of the star in the right leg of Aquarius, is a star of the fourth magnitude situated near the ecliptic on the south side.

According to fable, Aquarius was a beautiful boy whom Jupiter stole from Troy, and made cup-bearer to the gods. He is represented on maps, as a man pouring water from a cup, which running in a crooked stream south, is swallowed by Pisces Australis, the Southern Fish.

AQUILA: the Eagle, a constellation situated between Capricornus and Lyra. Its place is readily known by three large stars nearly in a line with each other. The group is represented in the annexed sketch.

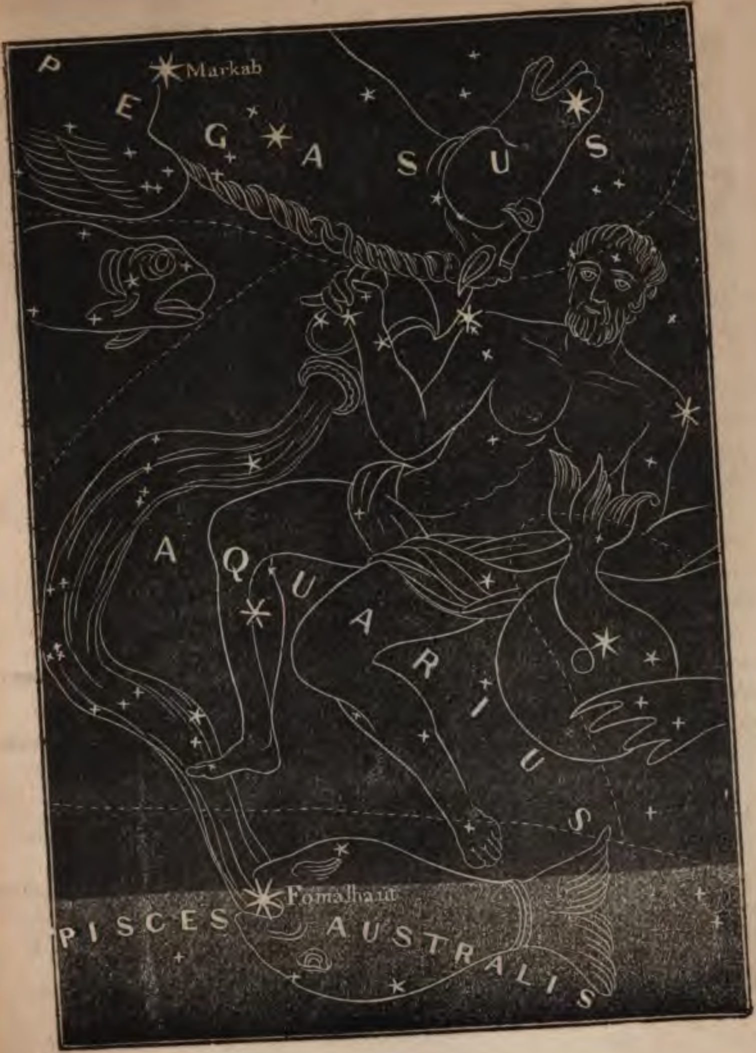


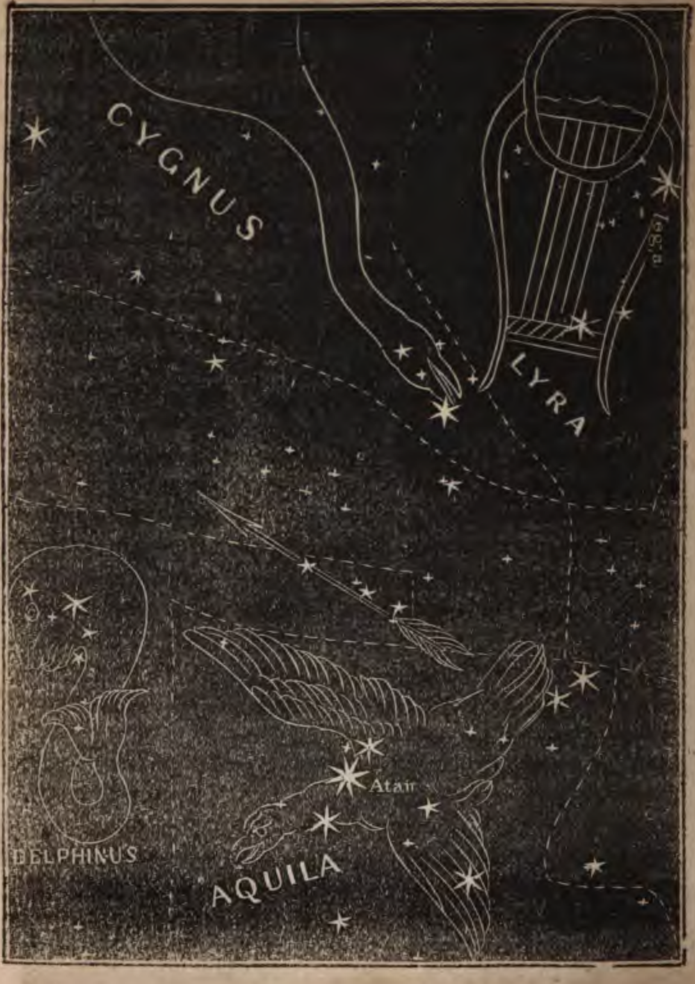
The largest or middle star is Atair. It comes to the meridian at 9, September 3. About 16° northeast of this, is a group of stars which form the constellation Delphinus, the Dolphin. About 9° north of Atair are three stars of the third magnitude called Sagitta the Arrow. The large beautiful star about 33° nearly northwest of Atair, is Vega, a double star of the first magnitude in the constellation Lyra. See Lyra.

This constellation is near the Galaxy, which here runs in two parts from southwest to northeast.

ARCHER: see Sagittarius.

ARCTIC CIRCLE: a small circle of the sphere parallel to the equator, and distant 23° 28′ from the arctic or northern pole.


PEGASUS
Markab
AQUARIUS
Fomalhaut
PISCES AUSTRALIS


CYGNUS
Vega
LYRA
DELPHINUS
Atair
AQUILA

ARCTURUS: a large and beautiful star of the first magnitude in the constellation Bootes. See Bootes.

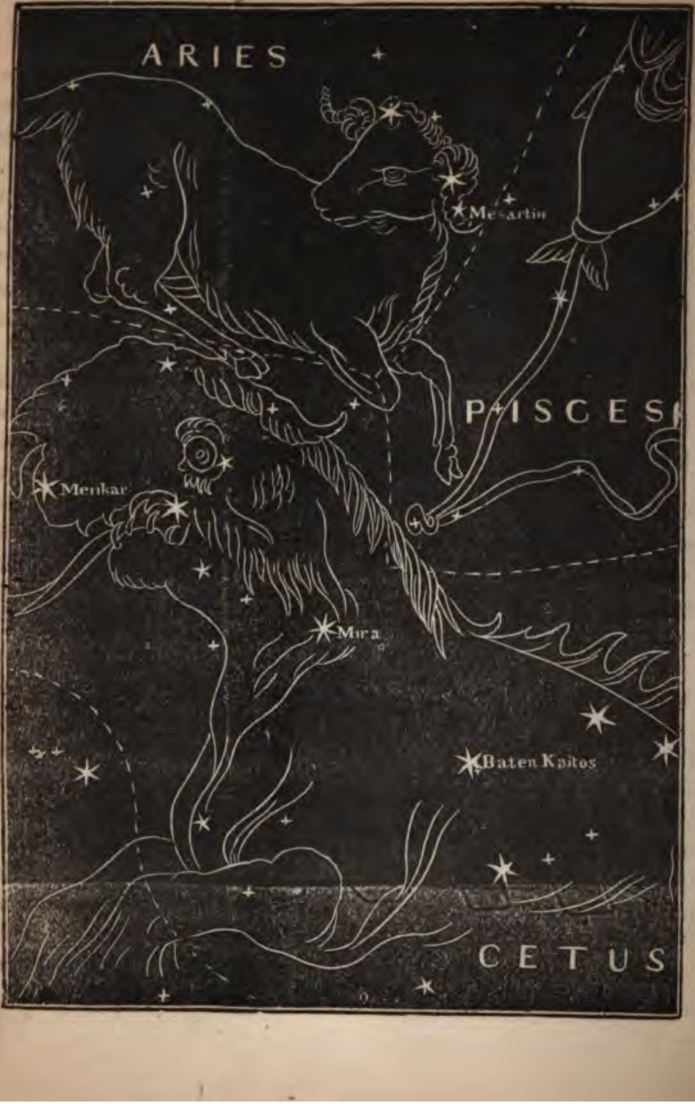
ARGO NAVIS: the Ship Argo, a constellation situated southeast of Canis Major. It has no stars larger than the fourth magnitude which can be seen from the United States, yet the south part of it, which lies within the circle of perpetual occultation, is most splendidly beautiful.

According to fable, this is the ship in which the argonauts Jason and his companions, sailed on the famous expedition for the recovery of the golden fleece. After accomplishing their object, the argonauts consecrated the ship to the god of the sea.

ARIES: the Ram, a constellation of the zodiac, situated between Pisces and Taurus. The two largest stars of this constellation are of the third magnitude, and situated in the ram's head. They come to the meridian at 9, December 6. In nautical astronomy, the most northerly one is called Arietis. These stars are about 27° a little south of east of the large star Alpherat, in the constellation Andromeda. The most southerly of the two, is a double star. About two and a half degrees south of it is Mesartin, a star of the fourth magnitude. About 20° southeast of these, is the star Menkar, in the nose of Cetus, the Whale. See Cetus.

The ram, is by some supposed to owe the honor of his situation in the heavens to his being a prolific animal, and therefore a fit type for representing the fertilizing influence of the sun in Spring; by others to the poetic fables of the ancients. Its history is as follows:

Athenas, king of Thebes, married Ino, daughter of Cadmus, and afterwards divorced her and married Nephele. They had two children Phryxus and Helle. After this, Nephele became insane, and was divorced by Athenus, who again took Ino. As the children of Nephele were to succeed their father, Ino conceived a mortal hatred toward them, and found means to persuade the


ARIES
Mesartin
PISCES
Menkar
Mira
Baten Kaitos
CETUS

oracle to order them to be sacrificed to the Gods. Being apprized of this, they fled to the king of Colchis, a near relation. The poets say they fled through the air on a ram with wings and a golden fleece, which took them on his back as they were going to be sacrificed. In their flight, Helle became giddy and fell into the Mediterranean sea, that part of which, was thenceforth called the Hellespont. On arriving at Colchis, Phryxus sacrificed the ram to Jupiter, or, as some say, to Mars, to whom he also dedicated the golden fleece. The Gods, it seems, were so well pleased with the sacrifice, as to place the ram in the heavens as a constellation. The recovery of the fleece was afterwards the object of the famous argonautic expedition.

ARIETIS: a star of the first magnitude in the constellation Aries. It is important in nautical astronomy, being used for ascertaining longitude.

ASTERION: the name of one of the greyhounds. See Caues Venatici.

ASTEROIDES: four small planets moving in orbits between those of Mars and Jupiter. They have all been discovered since the commencement of the present century. From the peculiar situation of their orbits, it is supposed they once formed but one planet, which may have been broken in pieces by some internal convulsion. These planets, according to Dr. Herschel, when compared with the others, dwindle into bodies but little better than a sort of comets. It has been supposed however, that his estimates owe more to his feelings than to his judgment. After enjoying the exclusive honor for about ten years, of having discovered a new planet, he could hardly relish the idea of sharing this honor with others, who regardless of whatever might be his notions of monopoly, discovered four new planets in quick succession, the particular circumstances of which, were such as to strike every astronomer with wonder and astonishment.

The younger Herschel says

the existence of these planets 'had been in some sort surmised as a thing not unlikely, on the ground that the intervals of the planets' orbits go on doubling as we recede from the sun, or nearly so. Thus the interval between the orbits of the earth and Venus is nearly twice that between those of Venus and Mercury: that between the orbits of Mars and the earth nearly twice that between the earth and Venus; and so on.' According to this ratio, the distance of the next planet's orbit should have been nearly twice those of Mars and the earth. This interval however, appeared to remain unoccupied, but its distance was again doubled by the orbit of Jupiter, after which the same ratio is continued to Saturn and Uranus.

Professor Bode of Berlin, first suggested the idea that a planet might exist between the orbits of Mars and Jupiter; 'and it may be easily imagined what was the astonishment of astronomers to find four, revolving in orbits well corresponding with the law in question.' On the supposition that these originally formed one planet, it is thought that more fragments may yet be found; that many smaller pieces revolve in space, and that some may not yet have settled into permanent orbits and are liable to being attracted to the neighbouring planets. This is the basis of one theory for accounting for the origin of Aeroliths.

The names of these planets are Vesta, Juno, Ceres, and Pallas. Ceres was discovered at Palermo in 1801 by M. Piazzi; Pallas in 1802 by Dr. Olbers; Juno in 1804 by Mr. Harding, and Vesta in 1807 by Dr. Olbers. Their dimensions are not yet considered as known. Dr. Herschel makes the diameter of Vesta two hundred and thirty-eight miles, Pallas eighty, and Ceres one hundred and sixty-three. Others give the diameter of Vesta two hundred and thirty-eight miles, Juno one thousand four hundred and twenty-five, Ceres one thousand and twenty-four, and Pallas two thousand and ninety-nine. For their distances from the sun, see Planets. They are distinguished in Almanacs by these characters Vesta ⚶, Juno ⚵, Ceres ⚳, Pallas ⚴.

ATAIR: a star of the first magnitude in the constellation Aquila.

ATLANTIDES: a name of the Pleiades or seven stars.

ATMOSPHERE: See Air.

ATTRACTION: is the name given to that property of all material bodies which inclines them to approach and adhere to each other. What the precise nature of this property is, has not been ascertained; its effects however are well known, and its importance may be appreciated, when we consider it the law or principle, adopted by the Supreme Architect, for sustaining in its proper place or motion, every individual member of the Universe. There are many kinds of attraction, as cohesion, the attraction of magnetism, electricity and the like; that more immediately connected with astronomy is called the attraction of gravitation. It is this which causes the apple to fall and which preserves the solar system in its place. A body once put in motion would move forward in a straight line if left entirely to itself or uninfluenced by any external force, yet the planets revolve about the sun nearly in circles; it seems then, that they are acted on by some force which is constantly bending them inwards from a straight forward direction, and confining them to nearly circular paths. As the sun has been found to be in the centre of these circles, we naturally look to that as the seat of this external force. You may illustrate these principles in an imperfect yet simple manner, by fastening a stone to one end of a string and holding the other in your hand, cause it by a proper motion of the arm to revolve in circles about your hand. Here the stone will represent the planet and your hand the sun, while the string which retains the stone in its course, will represent the attraction of gravitation. If you let go the string, the stone immediately flies off, not in a straight line it is true, as it is still attracted to the earth, and falls to it, by a curvilinear path. Were this power of universal attraction suddenly extinguished, the sun and planets, in short, every thing in motion, would from that moment move on in straight lines through the regions of space forever. On the earth, one of the more immediately obvious effects of attraction from external causes is that produced on the waters of the ocean, by the united influence of the sun and moon, as seen in the phenomena of the tides. See Tides.

AURIGA: the Waggoner, a constellation situated north of the east part of Taurus. At 9, January 24, when the Yd L is on the meridian, you will see a star of the second magnitude about 29° north of it, in the west side of the galaxy; this is in Taurus. North of this, a little to the east, is a double star of the second magnitude; this is in the right arm of Auriga. East of this, a little farther north, at the distance of about 11°, is a large and beautiful star of the first magnitude, called Capella, the Goat.

AURORA: is a name given to the twilight which precedes sunrise; it is more commonly termed *Daybreak.*

AUTUMN: the season following Summer, commencing with us on the 23d of September, when the sun enters the sign Libra. See Earth.

AXIS: This term may be defined as being that central line, or diameter, of a whirling ball, which is apparently at rest. See Earth.

B.

BALANCE: see Libra.

BEAR: see Ursa Major and Minor.

BELLATRIX: a star of the second magnitude, about 7° north of the Yd L in Orion. See Orion.

BETELGEUX: a double star of the first magnitude in the constellation Orion. Its position is about 10° a little west of north of the middle star of the Yd L.

BINARY STARS: the term binary is applied to a class of double stars, the individuals of which are found to revolve about each other. If you read the article *stars*, you will find them considered as suns, each probably the centre of a solar system like ours. The theory of the binary stars considers them as being two suns belonging to the same system. The knowledge of this most astonishing feature is comparatively new, and must entail the most lasting honor on its discoverer, Sir William Herschel, to whom the world owes more for its knowledge of the stars, than to any other man.

For viewing these objects, telescopes of very high power are generally necessary. Castor however, is an exception, as the two stars may be distinguished with a power of 90, though a power of 200 or 300 is more proper. The following table exhibits the periodical revolutions of such binary stars as are best understood.

Names of the Stars.	Period of Revolution.
γ Leonis	1200 Years.
γ Virginis	629
61 Cygni	452
σ Coronae	287
Castor	253
70 Ophinchi	80
ξ Ursae	58
ζ Cancri	55
η Coronae	43

BISSEXTILE: the same as leap-year. The length of a year is nearly 365 days and 6 hours; therefore at the end of a year of 365 days there will be six hours, which should be added to make up the year; it is however left to be added when the error has amounted to 24 hours, or a complete day. As four times six hours make a day, it is added to the fourth year. The additional or bissextile day, is added to the shortest month, February, which usually consists of twenty-eight days. The year 1836 is bissextile, and you will see by the almanac that February has twenty-nine days.

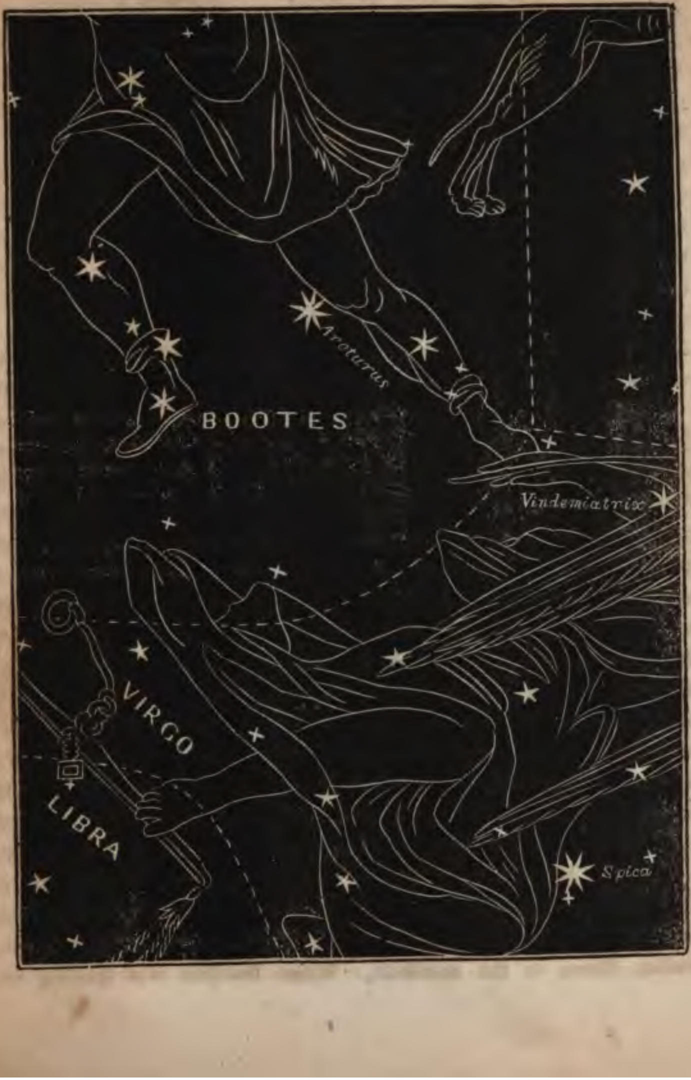
BOOTES: the Bear Driver, a constellation situated northeast of Virgo and west of Serpens. If you notice the arrangement of the principal stars in the picture, you will have no difficulty in ascertaining its position in the heavens. Arcturus, a most beautiful star of the first magnitude, comes to the meridian at 9, June 9; east of it, a little south, at the distance of about 6°, is a double star of the third magnitude. About 3° south of this, is another double star of the same magnitude. 5° northeast of the first, is another double star of the same, and about 8° north of this, a little west, is the double star Mirac, also of the third magnitude. About 5° northwest of this is a star of the fourth magnitude. About 6° west of Arcturus is another double star, of the third magnitude, the whole forming a rude representation of a sickle. These stars are represented in the north or upper part of the picture. The large star at the bottom is Spica in Virgo. Arcturus is thought by some astronomers, to be the nearest star to the solar system; excepting Sirius, it is the largest in the heavens.

Boötes is represented on maps as a man holding by a leash, two greyhounds, with which he is driving the great bear about the pole.

BULL: see Taurus.

C.

CANCER: the Crab, a constellation of the zodiac, situated between Gemini and Leo. It has but few stars, and none larger than the fourth magnitude. When the star Pollux, in the constellation Gemini, comes to the meridian at 9, February 26, you may see a star of the fourth magnitude about 16° southeast of it; this is in Cancer. About 8° north of this, you will find a star of the fifth magnitude, and northwest of this, about 2°, you may see a remarkable cluster of stars, which appear to the naked eye as a small whitish cloud; a telescope of very small power is sufficient for distinguishing its individual stars. See Nebula. This constellation is represented in the same picture with Gemini.


BOOTES
Arcturus
Vindemiatrix
VIRGO
LIBRA
Spica

CANES VENATICI: the Greyhounds; a constellation situated west of Boötes. At 9, June 9, when Arcturus comes to the meridian, you may see about 23° northwest of it, a star of the second magnitude; this is Cor Caroli, in the neck of the southern greyhound. It has no other large stars. The name of the northern hound is Asterion, the other Chara. See Boötes.

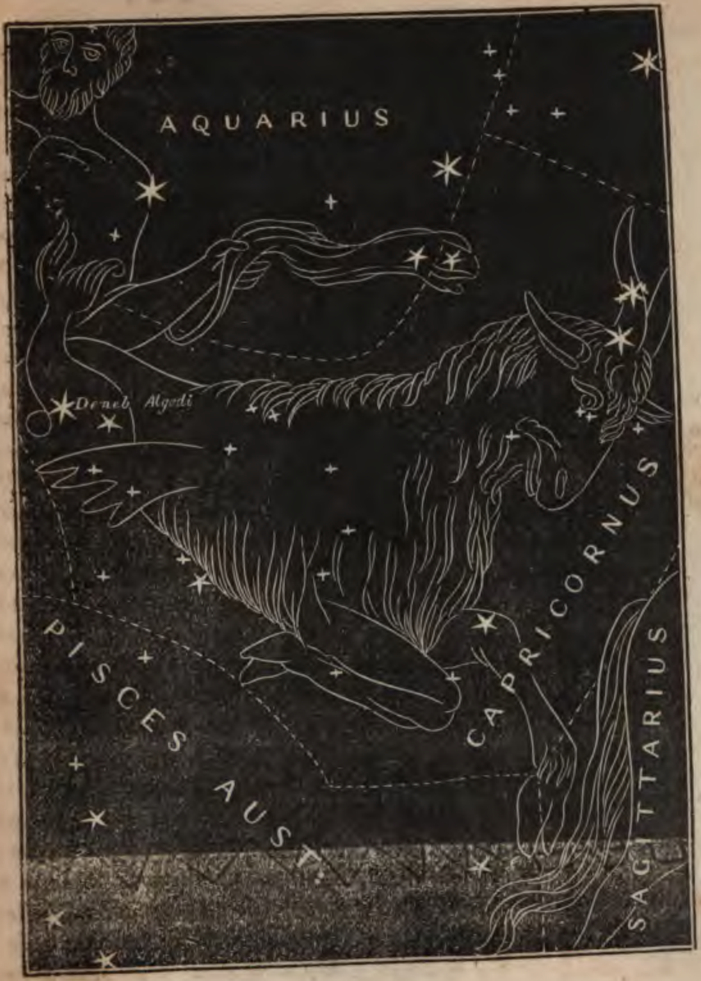
CANIS MAJOR: the Great Dog; a constellation situated southeast of Lepus and Orion. When Orion is above the horizon, during the winter months, you cannot fail of noticing a large and beautiful star about 20° southwest of it. This is Sirius, the largest star in the heavens. You will never forget it after being told that astronomers consider its real size to be more than fourteen times that of the sun. You will find part of this constellation represented in the picture of Orion.

CANIS MINOR: the Little Dog; a constellation situated south of Gemini. When the star Pollux comes to the meridian, February 25, you will find about 22° south of it, a star of the first magnitude; this is Procyon, in Canis Minor. See Gemini.

CAPELLA: the Little Goat; a star of the first magnitude, in the constellation Auriga. See Auriga.

CAPRA: a small northern constellation, consisting of but three stars.

CAPRICORNUS: the Goat: a constellation of the zodiac, situated between Sagittarius and Aquarius. When Aquila comes to the meridian, September 3, about 12° south and a little east of Atair, you will find a star of the third magnitude, and another of the fourth very near it, and above it to the west. These are in the horn of the Goat. Southwest of these, about two and a half degrees, is a double star of the third magnitude in the goat's head. About 22° east of this, is Deneb Algedi, a star of the third magnitude in the tail. Capricornus is represented on maps as a goat, the body terminating in the tail of a fish; its history is this. When Bacchus was feasting on


AQUARIUS
Deneb Algedi
CAPRICORNUS
PISCES AUST.
SAGITTARIUS

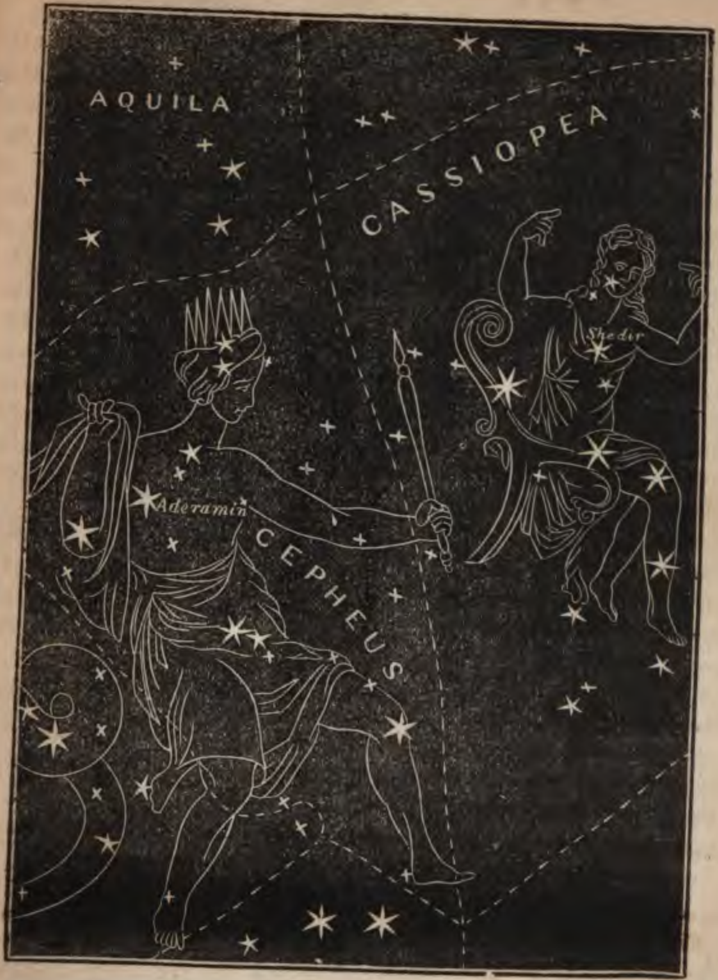
the banks of the Nile, he was surprised by the giant Typhon, and to escape his fury, took the form of a ram and plunged into the river, when that part of his body which was under water was changed to a fish. Jupiter it seems was highly amused with the adventure, and in commemoration of it, made the fish-tailed goat a constellation of the heavens.

CAPUT DRACONIS: the Dragon's Head. See Draco.

CAPUT MEDUSÆ: Medusa's Head. See Perseus.

CARDINAL POINTS: the four principal points of the compass, viz. east, west, north, south. The bearings of one star to another may puzzle you at first in many cases. As an instance, we will take the two stars in Ursa Major called the pointers; they come to the upper meridian at 9, April 9. At this time there can be no doubt as to the direction of one from the other; the larger star, or that nearest the pole, you see at once to be north of the other. In six hours, their position as referred to your horizon will be changed; they will then be to the left of the pole, and the larger star, as it regards the horizon, will be east of the other; still, as the poles of the world mark the north and south points of the heavens, you are to consider the large star north of the other. In six hours more when they will be near the north point of the horizon, they are still as much south of the pole as when above it. The point toward which stars near the pole appear to move, may be any thing but west, yet you are to consider it the true west, and the opposite point east; in short, that the diurnal circles of the stars form the true east and west, and that every direction from the pole is south.

CASSIOPEIA: a beautiful constellation near the north pole, situated north of Andromeda, between Cepheus and Perseus. There are few who are not acquainted with the group of large stars called the *dipper*. Exactly opposite this on the other side of the pole, you will find another group somewhat resembling the


AQUILA
CASSIOPEA
Shedir
Aderamin
CEPHEUS

letter W.; this is the constellation Cassiopeïa. The largest star is in the west part of it, and comes to the upper meridian at 9, November 10. It is then about 12° north of the zenith; it is of the second magnitude. Southeast of this, about 5°, is the double star Shedir, of the third magnitude. Northeast of these are three other stars also of the third magnitude. According to history, Cassiopeïa was wife of Cepheus king of Ethiopia. She boasted herself fairer than the Nereides, which so enraged these gentle sea-nymphs, that they persuaded Neptune to send a huge sea-monster to ravage Ethiopia. To appease Neptune, Cassiopeïa exposed her daughter Andromeda to be devoured by the monster. See Andromeda. Cassiopeïa is represented on maps as a woman sitting in a chair, surrounded by Perseus, Andromeda, and her husband Cepheus.

CASTOR: a binary star in the constellation Gemini. It is of the third magnitude and situated about 4° northwest of Pollux. Of the class of stars called binary, this is one of the most easily seen with a telescope of moderate power; a good three and a half feet instrument will enable you to distinguish the two individuals which compose it. See Gemini.

CELESTIAL: relating to the heavens, as celestial bodies, the sun, moon, planets and stars.

CENTAURUS: the Centaur, a southern constellation, situated south of Virgo. When Spica comes to the meridian, May 27, you may see south of it, a little east, a star of the second magnitude, about 10° above the horizon; this is in the right shoulder of the Centaur. About 11° west, is a star of the third magnitude, just above the left. The southern part of the constellation is below the horizon to the United States. Centaurus is represented on maps as half man and half horse. See Corvus.

CENTRAL ECLIPSE: see Eclipse.

CENTRIFUGAL FORCE: is that tendency in a revolving body to recede from the centre of its circular path, by flying off in a straight line. See Attraction.

CENTRIPETAL FORCE: is that which continually urges a revolving body towards a centre, and prevents its flying off in a straight line, and is therefore opposed to centrifugal force. See Attraction.

CEPHEUS: a northern constellation, situated between Cassiopeïa and Perseus. It is represented in the picture with Cassiopeïa. When Cassiopeïa is on the meridian above the pole, November 10, you may see to the left of it, farther north, a large and beautiful group of stars, mostly of the second and third magnitude. These form the constellation Cépheus. The star Alderamin is situated in the right arm, near the side. You may learn the positions of the others by inspecting the picture. See Cassiopeïa. According to history, Cepheus was king of Ethiopia and husband of Cassiopeïa. He was one of the Argonauts, and was made a constellation after his death. On maps, he is represented as a king holding a sceptre in his left hand.

CERES: one of the Asteroids.

CETUS: the Whale, a large constellation situated east of Aquarius and south of Pisces and Aries. The star Menkar, near the whale's mouth, comes to the meridian at 9, December 20. It is of the second magnitude, and about 22° from two stars of the third magnitude in the head of the ram. About 4° west of Menkar is a double star of the third magnitude, in the whale's mouth; about 8° southwest of this, is Mira, 'the wonderful star;' it is double and periodical, varying from the second magnitude to 0, or invisible. Its period is 334 days. Southwest of this about 10°, is Baten Kaitos, of the third magnitude, and nearly south of this is another star of the same; nearly west of this, about 11°, is a star of the second magnitude. Most of this constellation is represented in the picture with Aries.

COLUMBA NOACHI: Noah's

Dove; a small constellation south of Lepus and southwest of Canis Major. It has one star, of the second magnitude, which is about 23° southwest of Sirius.

COLURES: the two colures are imaginary circles through the poles, and four important points in the ecliptic. The equinoctial colure is a circle drawn through the poles and the two points of the ecliptic, where it is crossed by the equinoctial. The sun is in one of these points on the 21st of March, which is the time of the vernal equinox, and in the other on the 23d of September, which is the time of the autumnal equinox. To determine the position of this great circle of the heavens, you have only to notice what stars are on the meridian at midnight March 21, and September 23. The solstitial colure is a circle drawn through the poles, and those points in the ecliptic occupied by the sun on the 21st of June, when the days in the northern hemisphere are longest, and on the 22d of December, when they are shortest. At these times, the stars on the meridian at midnight will point out its place in the heavens.

COMA BERENICES: Berenices' Hair, a constellation situated north of Virgo, between Leo and Boötes. It has few stars visible to the naked eye.

COMETS: a class of celestial bodies of which, comparatively, little is known; they appear occasionally in the heavens, approaching the sun from one quarter, and, having passed it, disappear in another. Unlike the planets, they seem confined to no particular regions of the heavens, but seem distributed indifferently through space. The planets are confined, within certain limits, to the ecliptic, and are never seen beyond a certain distance north or south of it. In their revolutions about the sun, they all move from west to east: yet the comets are governed by neither of these laws, for they approach the sun, and sometimes pass near the ecliptic, sometimes near the poles; some move from west to east, others from east to west, the only law by which they seem influenced being that of gravitation. Their numbers are very great; several hundreds have been seen by the naked eye, and the telescope has increased the number to thousands; what they are, or what purpose they fulfil in the economy of nature, is unknown; that they are material bodies of some sort, is known from their being attracted by other bodies near which they pass. A few of them are considered as permanent members of the system, as they return at certain periods to the sun, moving in very elliptic orbits, some of which are known. The comet which appeared in 1835, afforded you all an opportunity of seeing it, and no doubt you were puzzled to guess why it had been considered an object of so much consequence, and the subject of so much speculation and conjecture. The important point, relative to this comet, is that its orbit is known, and the interval between its periodical returns has been calculated; comets of much greater magnitude and more splendid appearance have been seen, yet this, as it relates to astronomy, is the most important of all. The honor of first predicting its return belongs to Dr. Halley, a friend and contemporary of Sir Isaac Newton.

What can be the use or nature of these bodies, is a question which naturally occurs, but to which science can give no satisfactory answer; their peculiarities being subjects of much greater wonder to the astronomer, than to the children who gaze on them. They are material bodies, it is true, yet composed of such materials as almost to leave one in doubt as to their deserving the name. The younger Herschel says that 'the most unsubstantial clouds that float in the higher regions of our atmosphere, may be looked upon as dense and massive bodies, compared with the filmy and all but spiritual texture of a comet.' It is even probable that the substance is not to be compared for density, with the air we breathe; that if a volume of cometary matter could be weighed, it would not be found so heavy as an equal volume of atmosphere. I think you will understand some of the reasons that have led to such a conclusion. If you observe smoke, steam, or any vapor, you will find that the farther you are from it, the more difficult it is to see through it. The fog which hides the distant mountains, or even the sun, does not obscure those objects immediately about you; the thin vapor which you see at a distance covering the meadow, disappears on approaching it. A body of vapor, therefore, becomes at a distance perfectly opaque and impenetrable to the direct rays of the sun; so were the planet Mercury composed of materials of a like nature and density, they would still appear during a transit, like a black spot on the sun's disc. The comet, however, instead of obstructing the rays of the sun, offers little impediment to those of a star. No vapory substance perceptible to our senses *could* maintain any degree of transparency at a comet's distance, but, if the volume were large enough, would appear as a perfectly dense and opaque mass; yet during the visit of the comet of 1835, a star of about the tenth magnitude was seen through the most dense part of it, within 10″, or one three hundred and sixtieth part of a degree, of its centre. Through the centres of other comets, stars have been seen, so small that it would require a thousand to make one as large as the smallest of those seen by the naked eye. The conclusion, then is reasonable enough, that were thousands of these bodies placed between us and the sun, it would obstruct no appreciable portion of its rays, and that it would continue to appear in undiminished splendor.

We have seen that between all material bodies, there exists a bond of union, denominated the attraction of gravitation. This is exerted with a force proportionate to the masses of the bodies or the quantity of matter contained in them; the heavier body exerting an influence over the other in proportion to the difference of weight. You may illustrate this in a simple manner by fastening two stones of equal weight, one at each end of a string, and throwing them to a distance; in their course you will see them revolve in circles about each other, and a common centre, agreeing with the centre of the string. If you now try the experiment with two stones of unequal weight, you will find this common centre in a point of the string nearest the heavier stone; the lighter one being more powerfully acted on, describes larger circles, while the other remains comparatively at rest. We will now apply this to the case of a comet. When passing near a planet, comets are sensibly attracted by it, and their course becomes altered; and were their masses at all proportionate to that of the planet, its course would suffer a corresponding deviation; this, however, is not found to be the case. The comet of 1770, one of the few which have been found to return periodically to the sun, was drawn aside from its original course by the planet Jupiter, and became entangled with its satellites, and was finally thrown into an entirely new orbit, while the smallest satellite could not be seen to have suffered the slightest deviation from its usual path about the planet. What is very remarkable, the same comet, at its next return, became again involved with Jupiter and the satellites, and was again thrown into a new orbit. Thus, while the volumes of comets are immense, (being often greater than the largest planet,) we see that the amount of matter which they contain is slight and inconsiderable to a degree almost beyond conception. We are not surprised, therefore, at finding comets objects of intense interest to the astronomer; and the more so, perhaps, because their nature and uses are still unknown. Let him wonder on, and while he concludes that the whole mass of one scarce weighs a ton, let him consider that its importance in the system of the in the fall of 1835, returns at intervals of about seventy-five years and a half: consequently, it will not return again until 1911.

CONJUNCTION: It will be sufficient, at present, for you to understand by the conjunction of two or more celestial bodies, that they are situated on a line with each other and the pole; as when the moon is in conjunction with a star, one will be found exactly north of the other. You may make good use of these conjunctions for determining the places of the principal stars and the planets. Thus, on the morning of September 6, 1836, the moon will be in conjunction with the star Pollux, which will be seen about 2° north of it. About 11 o'clock the same evening, the moon will be in conjunction with Venus. This conjunction will take place while the moon is below the horizon; yet you may see Venus, the next morning, nearly 10° south of the moon. You will find these conjunctions carefully laid down among astronomical phenomena in Parley's Almanac, and Conant's Year Book, with ample directions for making the best use of them.

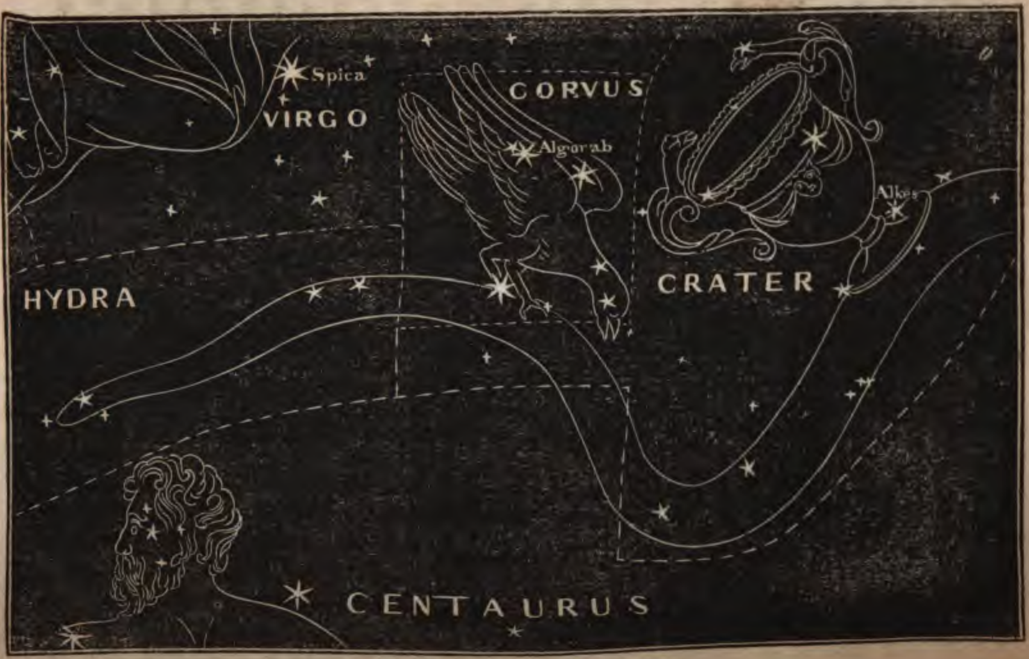
CONSTELLATION: an assemblage of stars represented by some symbol, such as an animal, or other figure. The region of the stars was portioned out by the ancients into several parts, in order to assist the memory in retaining their places and disposition. By such a contrivance, they become of easy reference; and though there is something ridiculous in the display of heroes, animals and monsters, represented in this arrangement, yet it is as convenient perhaps, as any that could be designed, and fully answers the purpose. The names of the constellations have the same relation to the stars, that the names of places do to the countries of the earth. I hope there can be no occasion for informing you, that you are not to look for these figures of men or animals traced in the heavens, any more than you would expect to find the boundaries of towns and countries delineated naturally on the earth, as you see them on terrestrial maps.

In this little book are given the names and situations of the principal constellations, with directions for finding their places in the heavens; and also the largest stars contained in them. When you have carefully learned these, you have accomplished a great deal in studying the stars; but in learning the places of all, you must have recourse to large maps, in which they are laid down with the names, letters, or numbers, which designate them; the largest star being generally marked by the first letter of the Greek alphabet, the next by the second, and so on. When this alphabet is exhausted, resort is had to Roman letters, and then to numbers. In learning their positions, you will lay a good foundation for astronomical knowledge, and at the same time derive much amusement and satisfaction. You may also combine your out-door winter evening sports with the study of the stars; and by knowing the times of their meridian passage, they will afford you a very tolerable means of estimating the time: you have thus a time-piece on a magnificent scale, which will not require winding up, and which is not liable to get out of repair. It is true it gains nearly four minutes a day; yet this quantity is constant, and you will soon be able to make allowance for it.

CORONA BOREALIS: the Northern Crown, a constellation situated north of Serpens, and west of Hercules. It is represented in the picture with Hercules. Its largest star, Alpheta, of the second magnitude, comes to the meridian at 9, June 28, and is then about 15° south of the zenith.

CORONA AUSTRALIS: the Southern Crown, a small constellation southwest of Sagittarius.

CORVUS: the Crow, a small but handsome constellation southwest of the star Spica in Virgo. When Spica comes to the meridian, May 27, you may see, about 13° to the right, and a little south, two stars, one of the third and the other of the fourth magnitudes.


Spica
VIRGO
CORVUS
Algorab
Alkes
HYDRA
CRATER
CENTAURUS

first of these is Algorab, a le star. South of this, about a star of the second magni- , and about 5° east of this is hiba, of the fourth magnitude. two large stars near the bottom of the annexed picture are in onstellation Centaurus.

RATER: the Cup, a constel- n west of Corvus, represented in the picture. It has one of the third magnitude, and f the fourth. See Corvus.

ROSIER: the Cross, a hern constellation never seen the United States.

ULMINATION: the same eridian passage. The pas- of a star across the meridian place, when above the pole, alled its upper culmination, when beneath it, its lower ination. See Meridian Pas- .

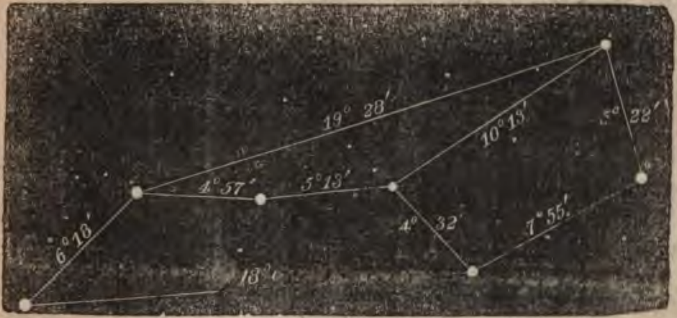
YGNUS: the Swan, a north- constellation, situated north- of Lyra. Deneb, a star of first magnitude, comes to the idian at 9, September 16, is very near the zenith, and e being no other star of this magnitude near it, you will easily recognise it. It has six stars of the third magnitude, but none of the second.

D.

DAY: that period of time taken by the earth to make a rotation about its axis; by which it brings a meridian of the earth again under the same star, or point of the heavens. This is the astronomical day. The day as commonly understood is called the civil day, and this is nearly four minutes longer than the other. As the earth revolves about the sun, it appears to us to remain stationary, while the sun appears to move among the stars from east to west. Now, suppose a particular star is on the meridian with the sun at noon: when the earth has made a complete rotation, the same star will be on the meridian again; and this completes the astronomical day: but the sun will have apparently moved nearly a degree to the east,—therefore it will not be on the meridian until nearly four minutes after, when the civil day is completed. The length of the astronomical day, in civil time, is twenty-three hours, fifty-six minutes, and four seconds.

DECLINATION: is the distance of a celestial body from the equinoctial, and is reckoned in degrees and parts of a degree, and is denominated north or south declination, according as the body is situated north or south of the equinoctial. As this great circle corresponds to the equator of the earth, so declination corresponds to latitude; so that when the sun is in that part of the ecliptic where it is crossed by the equinoctial, it will pass directly over the heads of the inhabitants on the equator. The latitude of Hartford, Conn. is 41° 46′; and as the declination of the star Almack, in the constellation Andromeda, is 41° 32′, it will pass very nearly through the zenith of that place.

DEGREE: a circle is conceived to be divided into three hundred and sixty equal parts, called degrees. The ecliptic, meridians, &c. are thus divided, and all distances reckoned on the sphere are estimated by this standard. By referring to Meridian, you will see that this great circle passes through the poles, the zenith, and nadir. To enable you to estimate distances in degrees, we will take a quarter of this circle: you are aware that one half of it must be above the horizon, the other beneath it; consequently the distance from the horizon to the zenith must be a quarter of it. One quarter of three hundred and sixty is ninety, which is the number of degrees denoting the distance of the horizon from the zenith. Now if you divide this distance into nine equal parts, each division must contain ten degrees. I think you will be able to do this readily; and when you have fixed this distance of ten degrees well in your mind, you will find no difficulty in dividing it into smaller portions of five, three, or two degrees. It may assist you to remember the distances from each other of some of the stars near the pole, which consequently never set, and may be at any time referred to. The distance from each other of the stars called *the pointers*, is five degrees and a half; that nearest the pole star is distant from it nearly twenty-nine degrees. The well known group of stars called *the dipper*, in which the pointers are situated, is here given, with the distances between the stars, near enough for the purpose.



By referring to Orion, you will see I have been rather particular in giving the distances of the principal stars in that region, as the constellation occupies a conspicuous place in the heavens. It may also be well to remember that the discs of the sun and moon are about half a degree in diameter.

Degrees are subdivided into sixty equal parts called minutes, and these again into sixty equal parts called seconds. Numbers expressing degrees have a small circle at top; minutes are expressed with a dash affixed to the number, and seconds with two dashes; thus 45° 15′ 30″, is read forty-five degrees, fifteen minutes, thirty seconds.

DELPHINUS: the Dolphin, a small constellation, which you will find represented in the picture with Aquila.

DIGIT: the discs of the sun and moon are conceived to be divided into twelve parts reckoned on a diameter, each of these is called a digit: thus, in an eclipse of the sun, when the moon apparently just touches the sun's centre, it is said to be 6 digits eclipsed; and so of the moon, when it has just entered wholly into the earth's shadow, it is said to be 12 digits eclipsed. In almanacs, you may sometimes see that the moon is to be eclipsed more than 12 digits; the earth's shadow being, at the moon's distance, broader than that luminary, is more than sufficient to cause a total eclipse. If, therefore, when the moon passes through the centre of it, the shadow extends to the distance of a digit on each side, the moon is said to be 14 digits eclipsed.

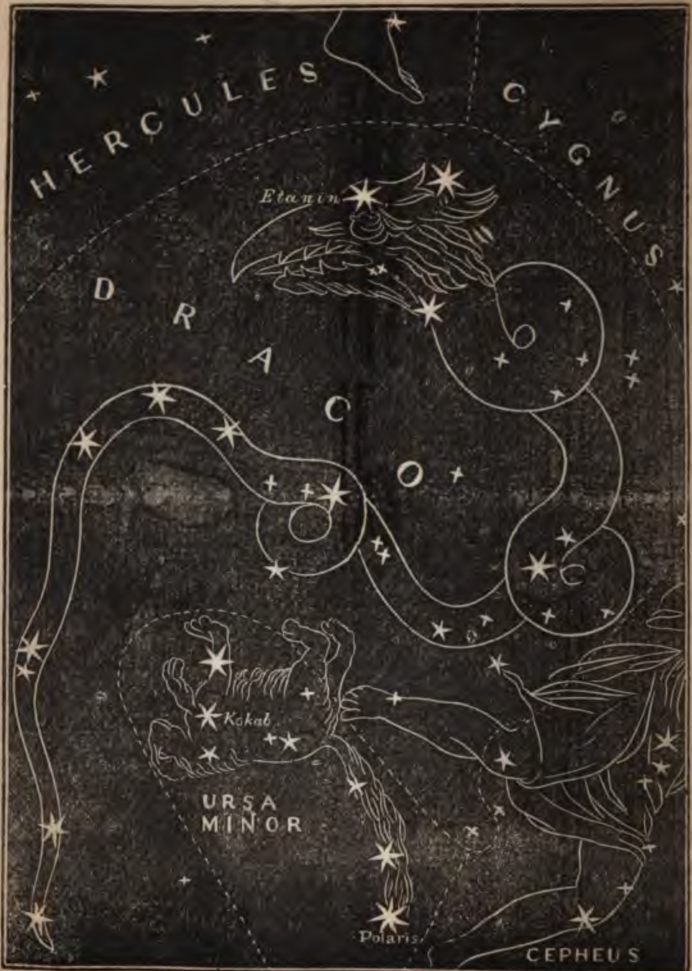
DISC: the body, or face, of a celestial body, as it appears from the earth. Of these, the only ones presenting discs visible to the naked eye, are the sun and moon. All the planets, excepting some of the asteroids, present discs when examined with the telescope.

DIURNAL ARC: is that portion of a circle described by a celestial body in its diurnal course above the horizon; the other portion, described beneath the horizon, being called the Nocturnal Arc. The length of these arcs, and consequently the time which bodies remain above or below the horizon, depends on the latitude of the place, and the declination of the object. At the equator, all celestial bodies continue six hours above, and as many below, the horizon; while at the poles, one hemisphere continues constantly above, and the other below. Bodies situated in the equinoctial, continue six hours above and as many below the horizon, to all places alike, excepting at the poles, where they appear constantly in the horizon. At places situated between the equator and the poles, circles of declination, and consequently the diurnal paths of the sun and other bodies will be elevated or depressed above or below the horizon, according to the latitude of the place. At Boston, for instance, the latitude of which is about forty-two and one-third degrees north, two-thirds of a circle of 29° south declination will be depressed below the horizon, and consequently an object having this declination, would remain above it, during only one-third of its diurnal course, or eight hours; while an object having an equal declination north, would remain sixteen hours above it; the circle being elevated two-thirds, or as much as the other is depressed. At the same place, the whole of a circle of forty-seven and two-thirds degrees, south declination is depressed below the horizon; and consequently all stars situated in or south of this circle never rise, while the opposite circle of north declination is wholly elevated above the horizon, and all stars in or north of it, never set, but perform their whole diurnal courses in circles about the north pole. The former circle, or that in which the stars never rise, is called the circle of perpetual occultation, and the latter of perpetual apparition. From the former to the latter, then, it seems that the diurnal arcs increase in a certain ratio, which, however, you will not be able to understand without a good knowledge of spherical trigonometry.

DRACO: the Dragon, a constellation situated north of Hercules. This is a large and beautiful constellation, containing four stars of the second magnitude, and many of the third and fourth. Its situation near the pole renders it favorable for observation when on the lower meridian. Etanin, a star of the second magnitude, comes to the meridian under the pole at 9, January 31. To the right of it, about 3°, is another star of the same magnitude. The position of the others may be learned from the picture on the next page.

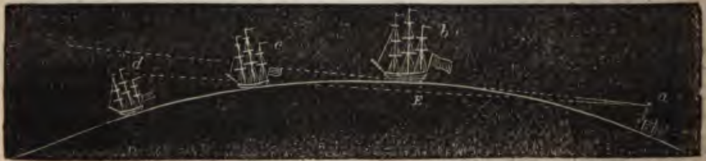
E.

EARTH: one of the planets, the third from the sun, revolving about it in an orbit between those of Venus and Mars. The earth, to us the most important planet, being that which we inhabit, was


HERCULES
CYGNUS
Etanin
DRACO
Kokab
URSA MINOR
Polaris
CEPHEUS

considered by the ancients an extended circular plain. Science, however, has proved that its form is nearly that of a ball, or sphere. The first direct proof of this may be found in the appearance of its shadow on the moon's disc during an eclipse, which is always a portion of a circle. This might be the case in some instances, were the earth a circular plain; as when the moon is partially eclipsed, when near the meridian, the earth's shadow, as seen on the moon's disc, would then be terminated by a circular edge: but suppose the moon to rise or set during an eclipse, the shadow would then be terminated by a line perfectly straight. You will readily understand this, if you consider the relative positions of the sun and moon with regard to the earth; the sun being at this time just below the horizon, in one quarter, and the moon just above it, in the opposite. The shadow in this case being also circular, we may consider the sphericity of the earth as determined. The earth is also proved to be globular from the fact, that ships have sailed entirely round it. The path of a ship thus sailing quite round the earth may be represented by a string, tied round an apple. The knot in the string may represent the place on the earth of the city of New York. The ship, it is true, must frequently turn from her course on account of continents, islands, &c.; yet, by returning again to it as often, she will arrive, without turning back, to the point from which she started. Suppose we look at a terrestrial globe, and go over the route by land or water, as occasion may require. Starting from New York, we cross the Atlantic ocean diagonally, with the American continent to our right, and Africa to the left; and continuing our course through part of the southern Icy Ocean, we arrive at the continent of New Holland. Crossing this and the island of New Guinea, we find ourselves in the great Pacific Ocean; and crossing this, we arrive at the northwest coast of the continent of North America.

Continuing our progress, we find ourselves at the Great Lakes, after which our course is through the United States home. Thus, having turned neither to the right or left, we have arrived at the point from which we set out. I think we can now get a nearer view of this sphericity in the form of the earth. For this purpose, we will take our stand at that part of it which appears perfectly level, the ocean. If we now look out upon the water, we shall see, that instead of its stretching on and on until it is lost by distance, or mingles with the sky, which would be the case if it were strictly level, that it is limited to a comparatively moderate distance, and that the horizon is well defined. In this situation, with the eye six feet above the water, the distance of the horizon is less than three miles; consequently, we cannot see all of that part of a boat which is above the water, if it be three miles off; and if a rock, fifty feet in height, be at the distance of eight miles, we can but just see the top of it. Here it is not the distance alone which reduces the rock to nearly a level with the ocean; for if we look at it through a telescope, we shall still be able to see but a few feet of the top. The reason is obvious; instead of the surface of the water being perfectly level, it forms a curve, part of which comes between the eye and the rock. We will now observe a ship that is getting under way, from a position that makes the height of the eye fifteen feet; the deck of the ship we will suppose to be fifteen feet from the water. We will illustrate this, and the several positions of the ship as she sails to a distance, by a diagram.



Here our position is represented at *a*; the position of the ship, as we begin to lose sight of the lower part of her hull, at *b*; and her position when we can just see her lower yards, at *c*; and again, when we have lost sight of her entirely, at *d*. The curve line above E, represents the surface of the ocean. As the ship sails from us, her distance, when we begin to lose sight of the lower part of her hull, is about four and a half miles; and when the hull entirely disappears, it is about six and one-third miles. If her lower yards are forty feet above the water, we lose sight of them at the distance of about seven and two-thirds miles. Suppose the whole height of the ship to be one hundred and twenty feet, she will disappear at the distance of about thirteen and one-third miles. To prove that her disappearance is not owing to the effect of distance alone, we have only to look from an elevation of one hundred and thirty-five feet, when we shall again see the whole ship distinctly. You have only to look at the diagram to see how the ship's disappearance is effected. You find that the spherical surface of the ocean is interposed between the eye and the ship; that the water is actually above an imaginary straight line drawn from her to the eye. All this proves that at least in one direction, the surface of the ocean describes a curve bending continually downwards; but let the direction of the ship be what it may, or from any part of the world whatever, similar results follow. It is even from observations and admeasurements like these, but conducted with great care and accuracy, that not only the exact figure of the earth has been ascertained, but also its dimensions. The circumference of the earth has been thus found to be 24,869 miles, and its diameter 7916.

As a planet, the earth revolves about the sun, at the distance of about 95,000,000 miles. It has a rotation about its own axis, or an imaginary line drawn from its extreme north point through its centre to the point opposite, or extreme south; by the former motion it produces all our variety of seasons which completes the year, and by the latter, the phenomena of day and night. It will, no doubt, be difficult for you to get rid of the idea that instead of the earth's turning on its axis, the sun and all celestial bodies, revolve about it once in twenty-four hours. You would experience a similar difficulty in a ship at sea. The ship as it moved through the water, would appear to remain perfectly at rest, while the water would apparently rush in a swift current by its sides. If the house you live in could be turned slowly round with an equal and steady motion, the hills and other objects seen from the window would appear to move in circles about it, while the house itself would apparently remain at rest. So with the earth: while it is constantly turning *over* from west to east, all bodies external to it, appear to move in the contrary direction from east to west. If it now appears unreasonable to consider this apparent motion as belonging to the earth, it will appear much more so to ascribe it to the celestial bodies when you have become acquainted with their distance and dimensions. Another difficulty also occurs; if the earth is thus turned upside down every day, why does not every thing on its surface fall off? This is a question asked by every child at its first lessons in astronomy; but is easily answered. The earth has neither upper or lower side; in this respect, all sides are alike; the point towards which all bodies tend, is its centre. If you refer to Attraction, you will there find that all material bodies are impelled towards each other by some unknown impulse, which has been called the attraction of gravitation, and which is more familiarly known as weight; this name being an expression representing the power which a body exerts in endeavoring to approach the earth's centre. All bodies, therefore, on whatever side of the earth they may be placed, are confined to its surface by this attraction of gravitation. By referring to *Tides*, you will see that the moon, though at an immense distance, has a power of attraction sufficient to interfere in a slight degree, with that of the earth; causing a tendency in loose bodies on the surface to approach it, in opposition to their gravitation towards the earth's centre. Were the moon of equal size and density with the earth, it would attract a body placed half way between them with the same force; and if a stone or other body were carried from the earth beyond this point, instead of falling downwards, as the expression is, to the earth, it would *fall* upwards to the moon.

I have said the earth revolves in its orbit about the sun, and must endeavor to make this motion apparent to you, in as plain a manner as possible, by bringing in the aid of your own observation. We will commence with the year, on the first of January, at midnight. Now notice what constellation of the zodiac is on the meridian: it is Gemini. You have observed the apparent course of the sun during the day, and by the position of that part of the circle which it described while above the horizon, you can estimate the place of that part below it, near enough for the purpose. The sun is now in the centre of this part of the circle, on the meridian beneath the pole, as you will readily perceive, which places the earth exactly between it and Gemini. Continuing the observation each midnight, we shall see that Gemini moves forward gradually, coming each successive night earlier to the meridian; the sun, I need not tell you, being always on the lower meridian at midnight. By the first of February, we shall find that Gemini has moved forwards about two hours, and that Cancer is now on the meridian; the earth being now between that constellation and the sun. Now, if we consider the sun and stars stationary, the earth must have moved from west to east to occupy its present position; as seen from the sun, it has moved along the ecliptic from Gemini to Cancer.

By the first of March, Cancer has apparently moved forward about two hours, and Leo is now on the meridian. By continuing our midnight observations, we shall find that Virgo is on the meridian April 1; Libra, May 1; Scorpio, June 1; Sagittarius, July 1; Capricornus, August 1; Aquarius, Sept. 1; Pisces, Oct. 1; Aries, Nov. 1; Taurus, Dec. 1; and Gemini again Jan. 1; the earth as seen from the sun having passed along the ecliptic from Gemini through Leo, &c. until it has arrived at the same point again in Gemini. It is evident from this, that to a spectator at the sun, the earth appears to describe a circular path among the stars. This path is the ecliptic, and is the same which the sun apparently describes, as seen from the earth.

As I hope you now consider the spherical form of the earth, its rotation on its axis, and its revolution about the sun as established, we will now consider the phenomena connected with these particulars.

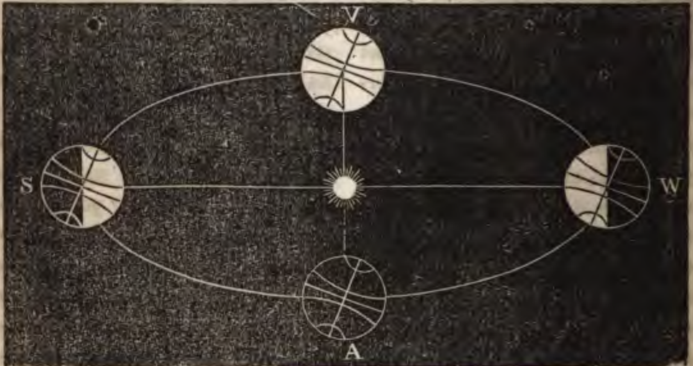
By a rotation on its axis, the earth turns every part successively to the sun, producing the phenomena of day and night. You may easily illustrate this by means of an apple with a wire through its centre, for an axis, with the ends protruding on each side, which will represent the poles, with a lamp at the middle of a table, to represent the sun. Hold the apple near the edge of the table, with the axis upright, or perpendicular to it, and turn it slowly round; the part enlightened by the lamp will now represent day, while the opposite part or that in its own shadow, represents night. At that part which is just entering the enlightened portion you have a tolerable sun-rise, and at that which is just leaving it, a sun-set; the point nearest the lamp represents noon or mid-day, and the opposite point midnight. Thus, on the earth, when it is noon to us, it is midnight to the inhabitants of New Holland; and when sun-rise to us, it is sun-set to them.

As every part is turned successively to the sun, you see that when it is noon at a particular place, it is past noon at places east of this, and is not yet noon at places west. From geography you know what is meant by longitude; that is, the difference east or west between two places. Now a difference of one degree of longitude makes a difference of four minutes in time; so that when it is noon at one place, it is four minutes past noon at a place 1° farther east, and wants four minutes of noon at a place 1° farther west. So when it is, say 3 o'clock at New York, at St. Louis, Missouri, which is 15½° farther west, it wants two minutes of 2; therefore, when the difference of longitude between two places is known, the difference of time may also be known; and when the difference of time is known, the difference of longitude may be known. Thus, if at New York we notice the time, and can by any means ascertain what time it is at New Haven at the instant, we can then know how much farther east New Haven is than New York. You may obtain some idea of the means of ascertaining the time at distant places, by referring to Moon.

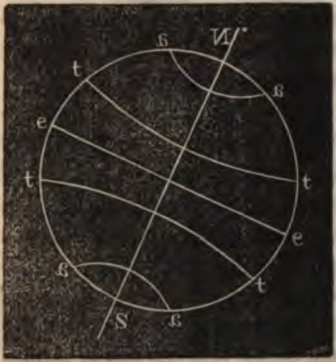
In this experiment, the days and nights are represented as equal throughout the earth. If we now incline the upper end of the axis a little to the light, calling it the north pole, and give it a rotatory motion as before, we shall see that the part at this pole remains enlightened during the whole rotation, and that the other pole continues in the shadow; every part of the northern half continuing longer in the illuminated portion than in the shadow; while every part of the southern half continues longest in the shadow. This experiment shows why the days are longer north of the equator than the nights; for by inclining the upper pole a little toward the light, it represents the position of the north pole of the earth during Summer; while the other represents the south pole during Winter; the poles of the earth being for a reason which we shall see presently, inclined alternately to and from the sun, during its annual revolution.

The inclination of the earth's axis to the plane of the ecliptic, in connection with its annual revolution, and its diurnal rotation, occasions the phenomena of the Seasons. If we suppose the centre of a round table to represent the place of the sun, and its circular edge, the ecliptic; then will the surface of the table represent the ecliptic's plane. If you now place an apple on the table, with the wire representing the axis perfectly upright, the north or upper pole pointing to the zenith, it will then be perpendicular to the plane. If you incline the axis so as to bring the upper end of it nearer the table, it will show what is meant by the inclination of the earth's axis to the plane of the ecliptic. This inclination is 23° 28′; that is, the point toward which the pole is directed is 23° 28′ from the point designated by a line perpendicular to the ecliptic.

In showing how this inclination is a principal cause of the different seasons of the year, we must make use of the annexed diagram.



Here the curve line represents the earth's orbit, which, being seen obliquely, forms an ellipse; the circular figures at V, S, A, W, represent the position of the earth with respect to the sun, at the winter solstice, vernal equinox, summer solstice, and autumnal equinox: the sun is represented in the centre. We will explain the lines you see drawn across these figures, by another diagram, and then return to this.



Here the circle represents the earth; the straight line drawn from N to S, through the centre, its axis; the end N, the north pole; and the end S, the south pole. The straight line, e e, dividing the northern from the southern half, represents an imaginary circle drawn about the earth, midway between the poles, which is called the equator. The curve, t t, north of this, represents another imaginary circle called the tropic of cancer, and the corresponding curve, t t, south, the tropic of capricorn; the small curve, a a, near the north pole, represents the arctic circle, and the corresponding curve, a a, near the south pole, the antarctic circle. These lines you see are similar to those drawn on the figures in the other diagram, to which we will now return.

At W, the earth is represented in its position on the 22d of December, the time of the winter solstice. At this time, the days are shortest, and the nights longest, to that half of the earth which lies north of the equator; while south of it, the days are longest, and the nights shortest. You see that in this position, the north end of the earth's axis is inclined from the sun, while the south end is inclined towards it. This inclination of the earth's axis remains constantly the same in every part of its orbit. By attending to the figure, you see that a less portion of the northern half is enlightened by the sun, than of the southern. You must also see that during a rotation, any spot in the northern half remains a less time in the illuminated part, representing day, than in the dark part, representing night; while south of the equator, the case is directly the reverse. All this explains the reason why the days are shortest and the nights longest when the earth is in this position, to that part lying north of the equator. For a certain space about the north pole, you see that no part can be illuminated by the sun during a rotation; the boundary of this space is the arctic circle. An equal space about the south pole remains constantly illuminated during a rotation; this is bounded by the antarctic circle. While the earth is in this position, the rays of the sun strike its surface more obliquely at those parts north of the equator, than at those south of it. At the tropic of capricorn the sun is vertical, and here the sun's rays strike the earth perpendicularly.

We will now refer to the figure at V, representing the position of the earth on the 21st of March, the time of the vernal equinox. Here the poles, though the inclination of the axis remains the same, are not inclined to or from the sun, as you may see by the figure. At this position, the days and nights are equal throughout the earth, and both poles are enlightened alike.

At S, is represented the position of the earth on the 21st of June, when the days are longest and the nights shortest in the northern hemisphere; while the reverse is the case in the southern. This is the time of the summer solstice. You see by the figure, that the sun is vertical at the tropic of cancer, that the space within the arctic circle must be illuminated during the whole rotation, and that the sun's rays strike the earth less obliquely at those parts north of the equator, than at those south of it, and still less so than when at the position at W. As the earth moves on in its orbit, it arrives at A, September 22, the time of the autumnal equinox. Here again the days and nights are equal, and all the circumstances are similar to those of the position at V. On the 22d of December, the earth completes its revolution by arriving again at W. You have seen, that when the earth is at this position, it is Winter with us, that our days are shortest and our nights longest, and that this difference becomes greater as we approach the poles, until we arrive at a place where it is constant night. The reason of this difference of the days and nights is manifest, from inspecting the figure. The reason why this is the season of cold, or Winter to us, is because the sun's rays strike our hemisphere more obliquely than at other seasons. It is true, this is considered the commencement of Winter, and that the coldest weather does not arrive until some time after. This is because the northern hemisphere still retains in a considerable degree the heat which it has accumulated during Summer. At this season, too, as the sun remains less time above our horizon, the heat of the earth becomes more cooled in its absence during the long nights. From this period, as the earth rolls on toward the position represented at V, the days gradually lengthen, and when it arrives at this point, the Spring is said to commence. This, however, depends on our distance from the equator. In the north part of the United States we have usually pretty cold weather after this period. We soon however begin to feel the effect of the increasing influence of the sun, which has for some time been apparently approaching us from the south; and as the earth moves on toward S, the Winter gradually gives place to Summer; the Spring being a kind of progression from one to the other. On the 21st of June, the sun attains its greatest altitude, and the days are now the longest, and the nights the shortest of the year. Still, some time must elapse before the hottest part of the season arrives, which is about the middle of July. By the 22d of September, the Autumn commences, the earth having arrived at A. Here again the days and nights are equal. The northern hemisphere, however, still retaining much of the heat of Summer, is warmer than when at V, although the immediate influence of the sun is the same. This season gradually introduces that of Winter, which commences Dec. 22d. Thus, by a contrivance the most simple that can be imagined, every shade and variety of the beautiful and grand which our seasons afford, the sublime grandeur of the winter storms, the delightful and endless profusion of the flowers of Spring, the heats of Summer and the Autumn harvests are produced; all brought about simply by the inclination of the earth's axis to the plane of the ecliptic. The diagram shows you, that when it is Winter with us, it is Summer south of the equator; and when it is Spring with us, it is there Autumn; and that from the 21st of March, to the 22d of September, the north pole continues constantly enlightened by the sun, while the south pole is not enlightened at all; and that from September 22, to March 21st, the south pole has its season of constant day, and the north pole its night.

The earth is encompassed by an atmosphere extending to the height of about fifty miles. It has one satellite. See Moon.

Some farther notice of the earth may be found in the article Planet.

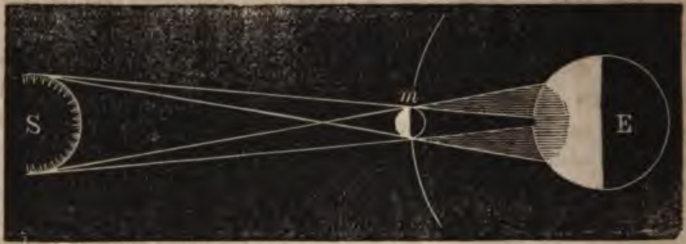
EAST: one of the cardinal points.

ECLIPSE: a phenomena of the heavens, whereby the whole or part of the sun's disc is hidden from a planet by the interposition of a satellite; or from a satellite by the interposition of a planet. By referring to Moon, you will see that this satellite revolves about the earth in an orbit which crosses the plane of the ecliptic at two opposite points. Now, as the sun's apparent annual path in the heavens is the ecliptic, it is evident, that if the sun be at or within a certain distance from either of these points at the time of the moon's change, the moon must pass between the earth and the sun, causing an eclipse wholly or in part, of that luminary: and if the sun happens to be at or within a certain distance of either of these points at the time of full moon, the earth must be between the moon and the sun, thereby intercepting the whole or part of the sun's rays, and causing an eclipse of the moon. These points are called the moon's nodes. If the centre of the sun is at one of the nodes at the moon's change, the centre of the moon must pass between the centre of the sun and the earth, and the sun will be centrally eclipsed. As the moon's orbit is not circular, but elliptical, it is not always at the same distance from the earth. When nearest the earth, its apparent disc is greater than the sun's; and when farthest from the earth, it is less. Therefore, if the sun is centrally eclipsed when the moon is at its least distance from the earth, the eclipse will be total, appearing somewhat like the preceding cut.

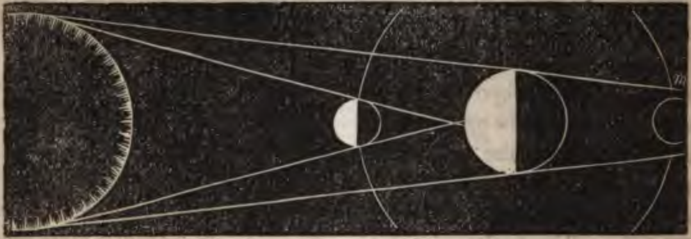
If the central eclipse happens when the moon is at its greatest distance from the earth, the eclipse will be annular; the moon's disc being smaller than that of the sun, the latter will appear like a ring, whence the name annular, which means ring-like. When the centres do not coincide, the eclipse will be partial.

The first of these figures represents an annular, the other a partial eclipse. In eclipses of the moon they may be total, even if the centres do not coincide. The earth being so much larger than the moon, its shadow is more than sufficient to cause a total eclipse; so that if the moon's centre is not in the centre of the shadow, the whole disc may be completely enveloped in it.

The annexed diagram will illustrate a total eclipse of the sun.



Here E, represents the earth, *m*, the moon, and S, the sun. It is plain from the figure, that at the point where the centre of the moon's shadow touches the earth, the eclipse must be total, and that for a considerable space about this point there will be an eclipse; yet, as a portion of the sun may be seen, it will be partial; for a space beyond this, the eclipse will not be visible. Another diagram will illustrate an annular eclipse.

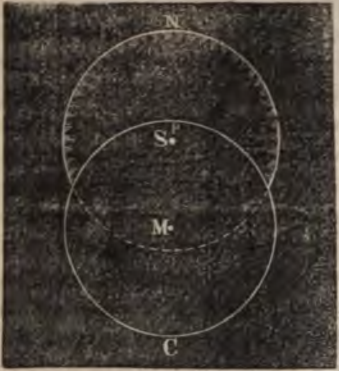


Here the moon's shadow does not reach the earth. consequently at the point where the eclipse is central, some portion of the sun's disc will be seen encompassing that of the moon. At *m*, is represented an eclipse of the moon.

The calculation of eclipses is a long and laborious, but not very intricate operation. I shall not enter into its details, but will endeavor to give you an idea of the nature of it, as I well remember what a wonderful matter I once considered it, that almanac makers could tell the exact time when eclipses were to happen.

It is evident from what has been stated, that for this calculation, the following are some of the particulars to be considered. The moment of the conjunction of the sun and moon; the sun's apparent distance from the nodes at the time of conjunction; its real distance from the earth from which the apparent size of its disc must be computed; the distance of the moon's orbit from the ecliptic at the place of conjunction; the distance of the moon from the earth at the time for the size of its disc,—these are to be calculated from lunar and solar tables constructed from long and careful observations, as mentioned in article Moon. These calculations are sufficient to show whether there will be an eclipse; and if there is one, how much of the sun's disc will be obscured. We will suppose that the results show that the apparent diameter of the sun is 30′; of the moon 30′; the distance of the moon's orbit south of the ecliptic at the place of conjunction, and consequently, the distance south of the moon's centre from the sun's, 12′. We will now draw what may represent a line of conjunction from N to C; and as the diameter of a circle is twice its distance from the centre, with an extent of the compasses equal to 16′, half the sun's diameter, taken from a scale of equal parts, we will describe a circle representing its disc, about the centre S. From this centre, measure a distance south toward C, equal to 12′, the distance of the two centres, taken from the same scale; and about this, as a centre, describe another circle, with an extent equal to 15′, half the moon's diameter, to represent the moon's disc, which now appears to overlap that of the sun, extending beyond its centre to p. The distance from p, to the most northern point of the sun's disc at N, being taken in the compasses, and applied to the scale, will be found 13′, the breadth of the phasis; and from p to q 19′, the breadth of the part eclipsed. As the diameter of the sun's disc is 32′, and a twelfth of this a digit, 19′

will equal 7⅛ digits, the magnitude of the eclipse on the south part of the sun's disc, or as the almanac makers say, 'on the sun's lower limb.'



To know the times of the beginning and end of the eclipse, it is only necessary to know how fast the moon moves in its orbit at the time, and the exact direction of its motion. For this purpose, it is necessary to calculate the exact place of the moon for a short period before or after the moment of conjunction;—say an hour before. This is to be calculated in the same manner as the place of conjunction, which is already known; and both these points ascertained, it shows the exact direction of the moon's motion toward the sun: and as it must move from one point to the other in an hour, its rate is also shown. You will now readily understand, that as the diameters of the two discs are already known, it will be easy to calculate at what moment and at what point the two discs apparently touch, which is the beginning of the eclipse, and at what moment and point they apparently separate, which is the end. The moment of conjunction may be considered as the middle of the eclipse.

For the reason that the sun is not eclipsed at every conjunction or change, and the moon at every opposition or full, see Moon.

ECLIPTIC: the path which the sun, as seen from the earth, apparently describes among the stars, but which is really the annual path of the earth, as seen from the sun. If you refer to Earth, you will there find that the stars come to the meridian nearly four minutes earlier each successive day. By noticing the place at the horizon where the sun sets, and afterwards observe what stars set soon after that point, you will be able to learn nearly the place of the ecliptic. It will be well to make these observations two or three times a month through the year. You will thus see that the sun appears to move eastward among the stars, describing annually a complete circle in the heavens. This imaginary circle is divided into twelve equal parts, called signs; and these are subdivided into degrees, &c. The signs, with the accompanying characters by which they are represented, are called Aries ♈, Taurus ♉, Gemini ♊, Cancer ♋, Leo ♌, Virgo ♍, Libra ♎, Scorpio ♏, Sagittarius ♐, Capricornus ♑, Aquaries ♒, Pisces ♓, receiving their names from these constellations, which once occupied the same places on the ecliptic. The sign Aries, once being in the constellation Aries; the sign Taurus, in Taurus; and so on. The time when the signs and constellations corresponded to the same place in the heavens, must have been more than 2000 years ago. That point in the ecliptic where the sun is, at the time of the vernal equinox, is always the first or zero point from which all distances measured on the ecliptic are reckoned. This point is always that which divides the sign Pisces from Aries, so that the sun, when it crosses the equinoctial from south to north, leaves Pisces and enters Aries. Now, if we ascertain this point in the equinoctial, where the sun crosses it in any given year, we shall find that in the succeeding year, it will cross it at a point something less than a minute of a degree farther west; therefore, the zero point, or first of Aries, is also farther west, and consequently, all the signs of the ecliptic; so that the constellations have an annual motion eastward of the signs of nearly a minute; and therefore a star in the equinoctial, which passes the meridian at a given time of a given day of one year, will at the same time of the same day of the next, be nearly 1′ east of the meridian.

This changing of the position of the signs with regard to the constellations, is called the precession of the equinoxes. See Precession.

ELONGATION: is the distance reckoned on the ecliptic, of a planet from the sun.

EQUATOR: see Earth.

EQUINOCTIAL: a circle of the sphere, dividing it into two hemispheres—a northern and a southern; the northern hemisphere having the north pole for its centre, and the southern, the south pole. This imaginary circle of the heavens corresponds to the equator of the earth: that is, both lie in the same plane—the equinoctial, as seen from the earth, passing throughout, immediately above the equator. All celestial bodies north of this circle, are said to have north declination, and all bodies south of it, south declination.

EQUINOX: that point in the equinoctial, where the sun crosses it from south to north; the time at which the sun crosses it from south to north being called the vernal equinox, and the time when it crosses from north to south, the autumnal equinox.

ERIDANUS: the River Po, a constellation winding from between Cetus and the south part of Orion, south to the circle of perpetual apparition. When Orion is on the meridian, you may see, about 20° southwest of it, a star of the second magnitude, and about 20° farther west, a star of the third magnitude: both are in this constellation. The latter star is about 13° south of Markab in Cetus.

F

FEBRUARY: the second month of the year. During this month the constellations Gemini and Canis Minor come to the meridian at nine.

FOMALHAUT: a star of the first magnitude in Pisces Australis. It comes to the meridian at 9, October 24.

G.

GALAXY: see Via Lactea.

GEMINI: a constellation of the zodiac, situated between Taurus and Cancer. By studying the picture, and referring to Orion, you will be able to find the principal stars in this constellation.

GRUS: the Crane, a constellation too far south for observation.

H.

HALO: a circle which sometimes appears about the sun and moon, occasioned by a damp or misty state of the atmosphere. The halo is a pretty sure prognostic of a storm.

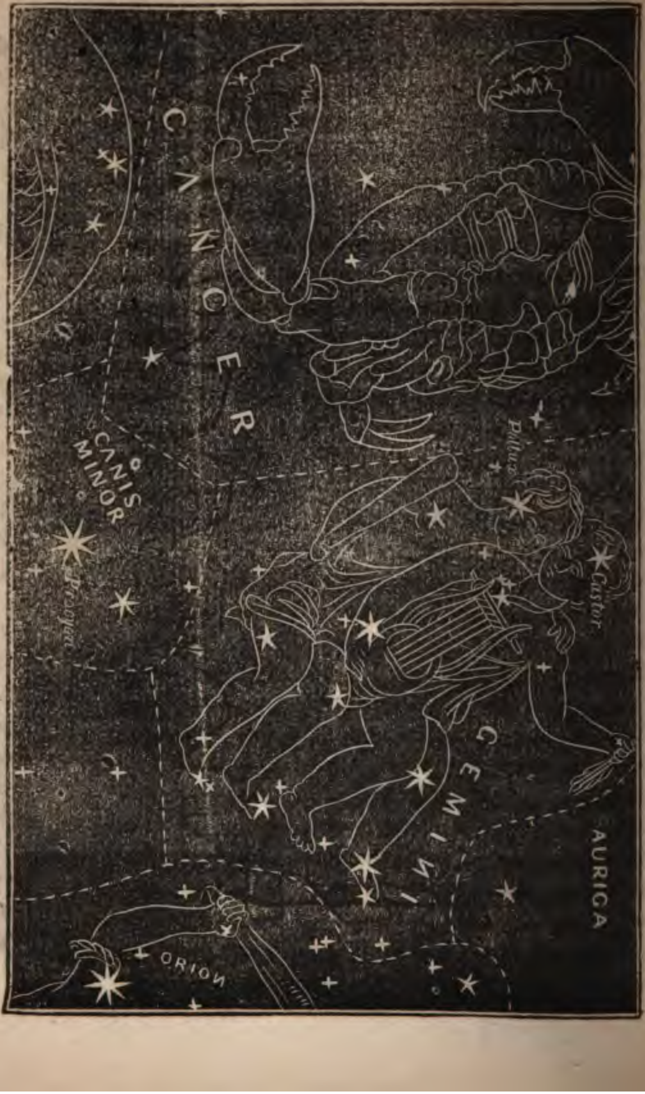
HEMISPHERE: any great circle, having for its centre, the centre of the sphere, divides it into two equal parts, each of which is called a hemisphere. Thus, the sphere is divided by the equinoctial into a northern and southern hemisphere. The plane of the horizon extended to the stars, divides the sphere into an upper and lower hemisphere.

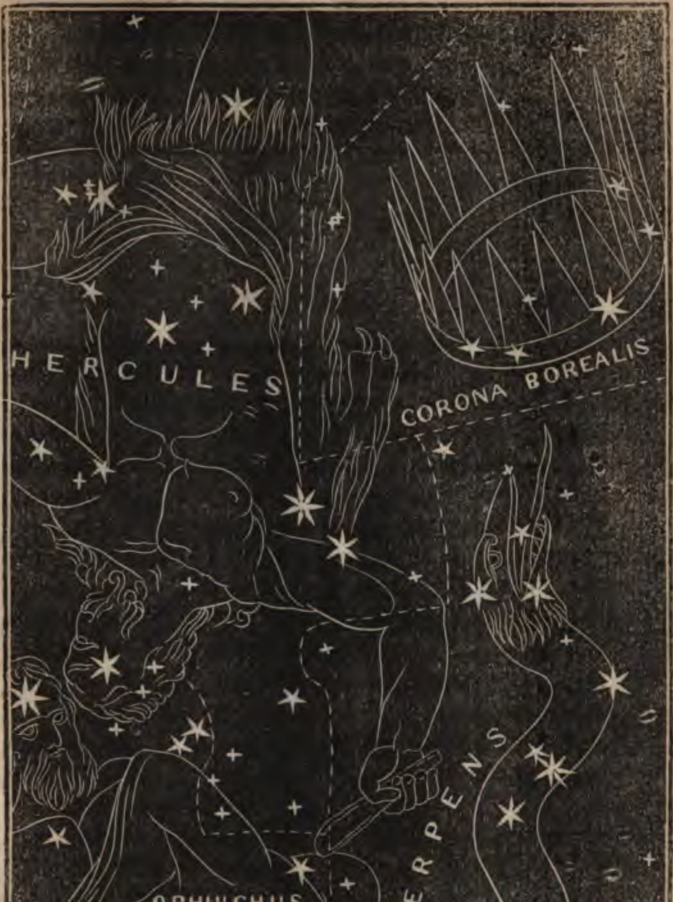
HERCULES: a constellation east of Serpens, and north of Ophiuchus. The place of its principal stars may be learned with the help of the picture. The star Ras Alhague of the second magnitude, is in the constellation Ophiuchus, and comes to the meridian at 9, July 28. The beautiful assemblage of stars to the right of Hercules forms the constellation Serpens.

HERSCHEL: a name of the planet Uranus. See Uranus.

HORIZON: that visible circular portion of the earth which may be seen from a given station. In astronomy, the horizon is supposed to be even like that of the ocean, and the eye of the observer at the surface. Thus, when the time of sunrise is given, it is understood as the instant when the sun appears above the ocean to an eye depressed to a level with the surface of the water.

HYADES: the name of a small cluster of stars about 4° west of Aldebaran, in the constellation Taurus.


CANCER
CANIS MINOR
Procyon
Pollux
Castor
GEMINI
AURIGA
ORION


HERCULES
CORONA BOREALIS
SERPENS
OPHIUCHUS

HYDRA: the Water Serpent, a constellation situated south of Cancer, Leo and Virgo. Cor Hydræ the serpent's heart, of the second magnitude, is about 24° southwest of Regulus.

I.

IMMERSION: denotes the beginning of an eclipse, an occultation, or a transit; or the instant a celestial body begins to disappear by the interposition of another, or by entering a shadow.

INGRESS: the entrance of the sun into any sign of the zodiac, particularly Aries.

J.

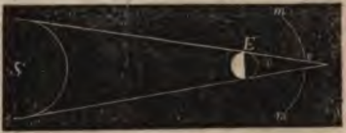
JUNO: See Asteroides.

JUPITER: one of the planets, the largest in the solar system, and, including the asteroides, the ninth from the sun. This planet is attended by four satellites, which were discovered by Galileo, on the 8th of January, 1610, with the first telescope ever directed to the starry sphere. With the telescope, its disc is seen crossed with dark belts, in the direction of its rotation on its axis. This appearance is probably owing to clouds, which owe this belt-like arrangement to currents in the planet's atmosphere; something analogous, perhaps, to the trade winds of the earth. The satellites, commencing with that nearest the planet, are called first, second, third, and fourth. The first revolves about the planet in a period of about one day and three quarters, at the distance of about 274,000 miles; the second in about three days and a half, at the distance of about 433,000 miles; the third, in about seven days, at the distance of about 700,000 miles; the fourth in about sixteen days and a half, at the distance of about 1,315,000 miles.

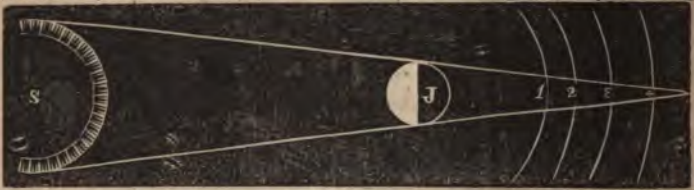
The appearance of Jupiter and his satellites, as seen with a three and a half feet telescope, is represented in the annexed picture;

the satellites being usually seen two on one side and two on the other. Sometimes three are seen on one side, and one on the other; and sometimes all are seen on one side; but never far from a line running parallel with the ecliptic, through the planet's centre, as the planes of their orbits coincide nearly with the plane of the ecliptic.

By referring to Moon, you may see, that because the moon's orbit does not coincide with that of the earth, the sun is not eclipsed at every change, or the moon at every full. The orbits of Jupiter's satellites agree more nearly with his own; and for this reason his eclipses are more frequent. Other circumstances combined with this, make the phenomena of almost daily occurrence. First, the great magnitude of the planet, and consequently of the cone of its shadow; and secondly, its great distance from the sun, which causes this cone to extend to a great distance behind the planet. This may be illustrated by a diagram.



Here S, represents the sun; E, the earth; c, the cone of the earth's shadow; and mem a portion of the moon's orbit. Now it is plain from the figure, that the larger the cone is at e, the greater the chance of the moon's passing through it, and being consequently eclipsed. It is also plain, that if the earth were farther from the sun, the cone would be longer, and its diameter at the distance e, from the earth, would be greater; consequently, the moon would pass oftener through the shadow and be eclipsed. Here is a diagram representing S, the sun; J, Jupiter; and the curves 1, 2, 3, 4, portions of the orbits of his satellites. Here you see that the cone of Jupiter's shadow extends to a greater distance from the planet than in the case of the earth. This, independently of the near coincidence of the orbits of the satellites with that of the planet, is sufficient for the more frequent occurrence of the eclipses of each. These circumstances combined with that of the great size of the cone, as depending on the size of the planet itself, are such that the three first satellites never pass above or below the shadow at 1, 2, 3, but through it, and are totally eclipsed at every opposition; the fourth sometimes, but rarely, passes above or below the shadow, and is not eclipsed. They also eclipse the sun at every conjunction, to some part of the planet; and as the planes of their orbits coincide nearly with that of the ecliptic, they are seen in one part of their revolution to pass over its disc, and at another behind it.



About the middle of August, 1836, this planet may be seen as *morning star* in Cancer, about 13° southeast of Pollux. By the middle of September, it will have moved 6° 30′ east, and 1° 31′ south. October 15th, it will be seen about 17° near northwest of Regulus, and will continue to approach it until December 4, when it will be stationary. Soon after this, its movement will be retrograde toward Pollux, until April 3, 1837, when it will be again stationary, about 16° southeast of Pollux. After this, its motion is again east, or direct, and by July 15, it will be about 13° farther east, towards Regulus. At this time, it sets soon after the sun, and will soon enter its beams, and will not be seen until the latter part of September, when it may be seen as *morning star*, about 12° east of Regulus. From this time, you may trace its progress eastward, to the end of the year, immediately after which it becomes stationary.

You may find further particulars concerning Jupiter in the article Planet. In almanacs, Jupiter is denoted by this character ♃.

K.

KOKAB: a star of the third magnitude in Ursa Minor.

KORNEPHORUS: a star of the second magnitude in Hercules.

L.

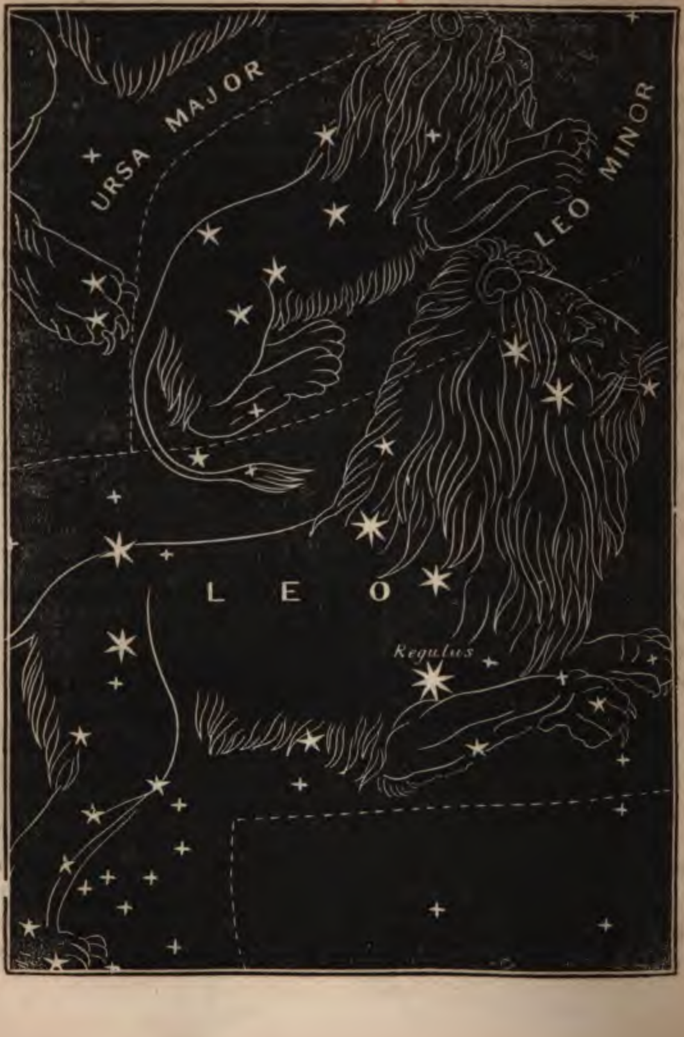
LEAP YEAR: see Bissextile.

LEO: the Lion, a constellation of the zodiac, situated between Cancer and Virgo. Regulus, a large star of the first magnitude, comes to the meridian at 9, April 6. The other stars may be learned with the help of the picture. Northeast of Leo, is Leo Minor, as represented.

Regulus is situated very near the ecliptic, and will therefore help you to learn the place of this great circle of the heavens.

LEPUS: the Hare, a small constellation south of Orion. See Orion.

LIBRA: the Scales; a constellation of the zodiac, situated between Virgo and Scorpio. When Spica, a star of the first magnitude in Virgo is on the meridian, May 27, you may see about 21° east of it, a little south, a star of the third magnitude. This is Zuben el Chamali in Libra. Regulus may now be seen to the west, and as these three stars lie


URSA MAJOR
LEO MINOR
LEO
Regulus

very near the ecliptic, you may determine its position by them. South of Zuben el Chamali, and a little east, about 11°, is Zuben el Gubi, of the same magnitude. The beautiful group to the east, is the constellation Scorpius.

We need little assistance from fable to enable us to imagine a reason for making the Scales a constellation. As you have already seen in article Ecliptic, it formerly agreed with the sign Libra; and as the sun enters this sign when the days and nights are equal throughout the world, what better emblem could have been chosen than this? It is probable the ancients adopted all the signs as hieroglyphic emblems of circumstances connected with the seasons, though their signification may now be lost.

LONGITUDE: is the distance of a celestial body from the Vernal equinox, reckoned eastward on the ecliptic.

LUCIFER: a name of the planet Venus, when it appears as morning star.

LUMINARY: the sun and moon are by way of distinction called luminaries.

LUNA: a name of the moon.

LUNAR: any thing relating to the moon.

LUNATION: the period which elapses between two successive changes of the moon.

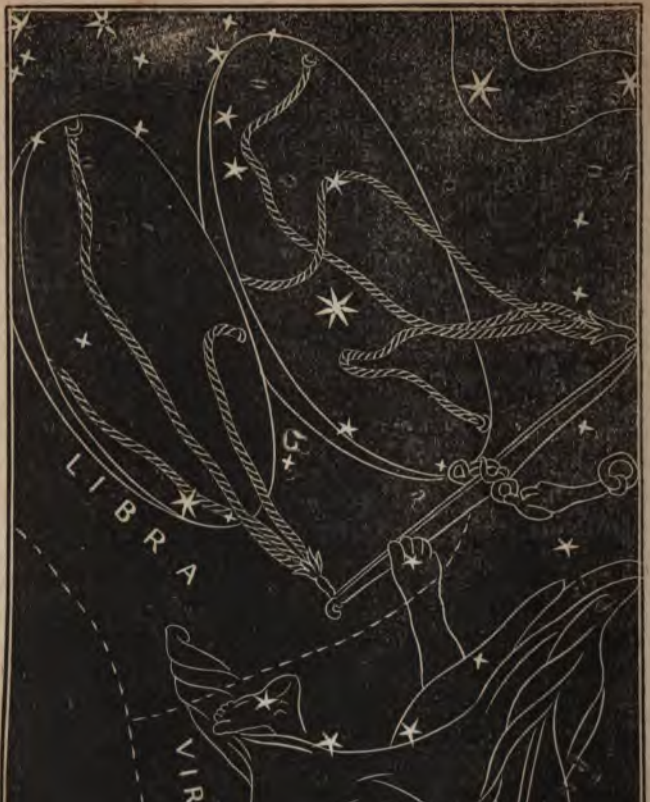
LUPUS: the Wolf, a southern constellation, situated southwest of Scorpius, and mostly within the circle of perpetual occultation.

LYNX: a constellation of a few small stars situated north of Gemini.

LYRA: the Harp, a constellation situated northeast of Hercules. Vega, a large and beautiful star of the first magnitude, comes to the meridian at 9, August 12, at which time it is near the zenith, and as there is no large star near it, you will easily recognise it. Lyra is represented in the picture with Aquila.

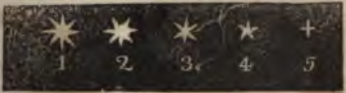
M.

MAGNITUDE: for convenience, the stars have been ar-


LIBRA
VIRGO

ranged into classes, according to their apparent size, called magnitudes; the largest being denominated those of the first magnitude; the next, the second, and so on. This classification is not to be considered as very exact, as it would be impossible to effect any thing more than a loose and general distribution of objects of such an infinite variety in apparent size and brilliancy. All that can be done, is to select those which approach tolerably near to a certain standard for one class, those an indefinite shade smaller for the next, and so on until the arrangement is completed. In this way, astronomers have selected fifteen or twenty, the largest, for those of the first magnitude: the second comprises fifty or sixty, and the third, about two hundred. The smallest stars visible to the naked eye, are those of the sixth, or at farthest, the seventh magnitude. From the first to the seventh are reckoned 15,000 or 20,000. With the telescope, the classification is extended down to the sixteenth, without reckoning those extremely minute stars which powerful instruments exhibit by infinite millions. An opera glass which makes an object appear three or four times as large as to the naked eye, will distinctly show the stars of the eighth or ninth magnitude. A good instrument of this kind, which may be had for four or five dollars, however insignificant it may appear compared with the larger telescope, is an excellent thing for the star-gazer; for this purpose, those having the largest object glasses should be selected.

In this work, stars of the first magnitude are represented with eight points or rays, those of the second, with seven; the third with six; the fourth with five; and the fifth with four, thus—



MARCH: the third month of the year. On the twenty-first of this month the sun enters the sign Aries. This is the time of the vernal equinox, and the commencement of Spring.

MARS: one of the planets, and the fourth from the sun, revolving in an orbit exterior to that of the earth, and between it and the orbits of the asteroides. For the distance from the sun, magnitude, &c. of Mars, see Planet. The most common appearances of Mars are represented in this picture.

The telescopic appearance of this planet is variable, and sometimes very beautiful and interesting. It has one permanent characteristic however, its constant reddish color: this is ascribed by some, to the great height of its atmosphere, by others to the real color of its soil. The axis of Mars like that of the earth, is inclined to the plane of its orbit; it may therefore be inferred that it has a variety of seasons during its revolution. This is thought to be confirmed by peculiar appearances at its poles. At the pole, inclined from the sun during its long winter, (nearly twice as long as ours,) it is much more luminous than at other parts of the planet. As this pole becomes inclined to the sun during its summer, this extraordinary brilliancy gradually disappears, and is in turn assumed by the other pole. These appearances are supposed to be occasioned by the great accumulation of ice and snow at the winter pole. Some of the most remarkable appearances assumed by this planet are here represented.

To the naked eye Mars appears of a red color, resembling the star Aldebaran. It may be seen in the morning Sept. 1, 1836, in the constellation Taurus, 16° north of Betelgeaux. On the 15th.

it will be in Gemini, about 8° southwest of Pollux. October 15, it will be in Cancer, about 17° southeast of Pollux. November 15, it will be in Leo, about 17° northwest of Regulus. December 19, it will be in conjunction with Regulus, and about 3° north of it. December 28, it will become stationary, about half a degree north of Regulus, after which its motion will be west, or retrograde. January 15, 1837, it will be about 5° northwest of Regulus. February 15, it will be about 17° northwest of Regulus. March 18, it will be stationary in Cancer, about 16° southeast of Pollux. After this, its motion will be east, or direct. May 25, it will be again in conjunction with Regulus, and about 1° north of it. Its motion east and south, will now become more rapid, and at the end of the year, it will be in the constellation Sagittarius, about 31° south of Atair.

As the orbit of Mars is exterior to that of the earth, his distance from us, when in opposition to the sun, must be less, by the whole distance of the earth from the sun, than when in conjunction. He will be in opposition, February 5, 1837, at which time his distance from us, will be about 50,000,000 miles.

For further particulars concerning Mars, see Planet.

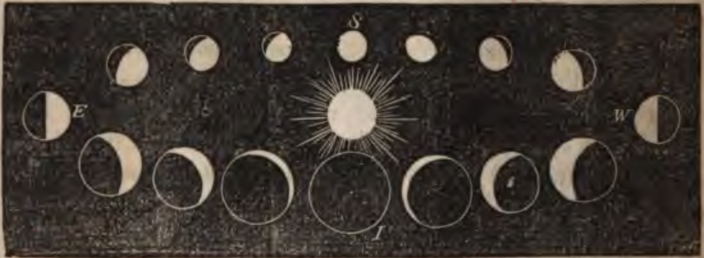
In almanacs, Mars is represented by this character, ♂

MASS: is the expression of the quantity of matter contained in bodies, without reference to their magnitudes, and is represented by their weight. Thus the mass of a cubic foot of lead is greater than that of a cubic foot of water. As the power of attraction exerted by one celestial body on another, depends on its mass, when this power is once known, its mass is easily ascertained. It has been found from this, that the planets are of very different degrees of density. Thus, though the bulk of Jupiter is nearly 1300 times that of earth, his weight exceeds it only in the proportion of 312 to 1; his density being nearly the same as that of water. The density of Saturn is about the same as that of cork.

MAY: the fifth month of the year. The constellations which come to the meridian at 9, during this month, are Ursa Major, Corvus and Virgo.

MERCURY; one of the planets, and that nearest the sun. As seen from the earth, the greatest distance of Mercury from the sun is less than 29°; consequently, his orbit must be within that of Venus, which is sometimes seen at the distance of 48°.

In its revolution about the sun, Mercury exhibits phases like the moon, a proof, if other proof were wanting, that its orbit is always within that of the earth: this is illustrated by the annexed diagram.



Here the white circular disc at S represents the planet at its superior conjunction with the sun, in which situation it appears round like the full moon, and for the same reason—its enlightened side being towards us. This is readily seen by attending to the diagram, where the central figure represents the sun between us and the planet at S, which must here receive the sun's rays on the side towards us. Here too, the planet's distance from us must be greatest, and consequently its apparent size must be least. As its orbit seen from the earth is nearly that of a circle seen edge wise, it follows, that as it moves from S, it must approach nearer to us: its course is toward E. As it leaves S, its figure begins to lose its roundness, and become gibbous; as it moves on toward E, still less of its illuminated side is seen, and as it has come somewhat nearer, its apparent size is greater. At E, half of the enlightened side is seen, and the disc has apparently increased to twice its former diameter. This is the place of its greatest eastern elongation from the sun, and its motion from thence is west, or retrograde toward I. Its disc now gradually assumes the crescent form, which becomes thinner and longer until it is lost at I, by the dark side of the planet being toward us. After this, as it moves toward W, its thin crescent is again seen, but on the other side, increasing in width until at W, the place of its greatest western elongation, we again see half the enlightened side. Here again, as the planet has increased its distance from the earth, the apparent diameter has diminished accordingly, and is now the same as at E. From E, its motion is again direct or eastward toward S, where its disc again becomes circular.

By considering the subject attentively, you will perfectly understand the nature of all these changes in the appearance of the planet; and as you see that the enlightened side, from the round or full to the crescent, and from the crescent to the full, whatever be the planet's position, is constantly that next the sun; you will rightly conclude that it can shine by no light of its own, but by that which it receives from the sun.

This planet is so near the sun, that it is not often seen without the telescope. To those who have not the use of this instrument, properly mounted, the most favorable times for seeing it will be November 7, 1836, when it will rise about an hour and three quarters before the sun. Its position will be about 4½°, nearly east of the star Spica in Virgo. May 13, 1837, it will set nearly two hours after the sun, and may be seen about 10° northeast of

Aldebaran. October 18, it will rise nearly an hour and three-quarters before the sun, and may be seen about 11° northwest of Spica.

Sometimes, at its inferior conjunction, this planet passes directly across the sun's disc, appearing on it as a round black spot, and furnishing the most direct and conclusive proof that its orbit lies within that of the earth. This phenomenon is called a transit of Mercury.

In almanacs, Mercury is denoted by this character ☿.

MERIDIAN: in astronomy, is a meridian of the earth extended toward the starry sphere. The meridian of a place on the earth is an imaginary circle drawn through the poles and the place, crossing the equator at right angles. The celestial meridian corresponds to this, passing through the poles, the zenith and nadir, and crossing the equinoctial at right angles. In either sense, the meridian is the true north and south line, and referred to the horizon, marks its north and south points.

It is convenient for those in the least engaged in the study of astronomy, to know the direction of this line by some permanent mark, for which it is necessary to notice some prominent point in the southern horizon, and another in the northern, and be able to refer to these. This may be done with sufficient accuracy for the purposes of the young star-gazer, by means of a surveyor's compass, allowing for the magnetic variation; or by noting the point directly under the sun at apparent noon for the south, and under the pole star for the north. The meridian line of your horizon being once determined, it is easy to produce it to the sphere, by imagining a line there, lying exactly above your meridian throughout. You are now to accustom yourself to noting the passage of the stars across this imaginary line: and when you are able to do this, you will have no difficulty in recognising every star, by previously knowing the time of its meridian passage, and its distance, within a few degrees, from the zenith or horizon, or its distance and bearing from some known star.

You frequently find the terms upper and lower applied to the meridian. The former applies to that part which passes from one pole, through the zenith to the other; the latter, to that which passes from one pole to the other through the nadir: Thus the sun passes the upper meridian at apparent noon, and the lower at apparent midnight. If you notice what stars near the pole pass the upper meridian at about 6, in a long winter evening, you may see the same stars pass the lower meridian about six the next morning.

MERIDIAN PASSAGE: see Culmination.

METEOR: This is the term applied to those appearances usually called shooting or falling stars. It is only necessary to say, that instead of being real stars, *falling from their spheres*, they are considered as of electric origin, and generated in the atmosphere.

MILKY WAY: see Via Lactea.

MINUTE: in space, the sixtieth part of a degree.

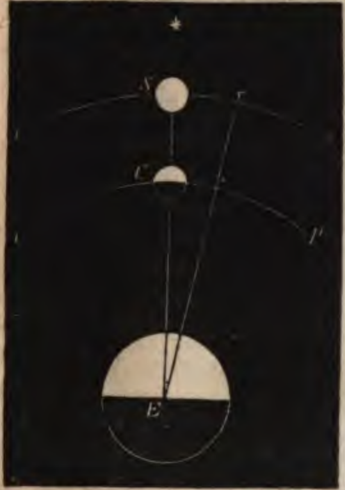
MONOCEROS: the Unicorn, a constellation situated south of Gemini. It is large, but contains few stars, and those of small magnitude. When Sirius comes to the meridian, Procyon of the first magnitude in Canis Minor may be seen about 26° northeast of it. A straight line drawn from one of these stars to the other, passes through Monoceros near the middle.

MOON: the earth's satellite, revolving about the earth at a mean distance of about 240,000 miles in a period of twenty-seven days, seven hours and forty-three minutes. This is not the whole interval which elapses between two successive changes, this period being twenty-nine days, twelve hours and forty-four minutes. Its diameter is about 2,160 miles.

Of all celestial objects, the

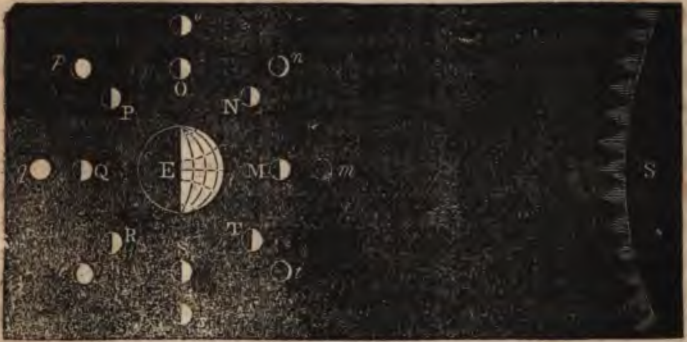
moon is the most beautiful and interesting, and to the astronomer, the most important. Its changes, different phases and eclipses, as well as those of the sun which depend on it, are phenomena, which, however much accustomed to, we never cease to look upon with interest. Who ever sees the fine thin crescent of the new moon, without stopping to gaze with admiration? or who ever sees the round full orb just rising at sun-set without emotion? The stars may bespangle the skies with their glittering millions, but for our true *beautiful evening*, the full moon is indispensable. Besides its interest as the most splendid ornament of our skies, and a light in the absence of the sun, it is of vast consequence to the astronomer, who obtains from observation of its motion, the elements for performing the greater part of his most important operations. If you are now informed for the first time, it may surprise you to learn that distances on the earth's surface may be measured much more accurately by observations on the moon than by any other means: But this I shall endeavour to explain by and by.

As the moon revolves about the earth from west to east, it exhibits all those changes in its form with which we are so familiar,—the New, the Quarter, and the Full, which are denominated phases. If we notice when the centre of the moon is exactly on a line drawn through a particular star to the poles, an hour will be sufficient to show that it has moved to the eastward, leaving this line to the west. If we continue our observation from night to night, we shall find that by moving constantly in the same direction, passing the sun at its *change*, in about twenty-seven days and a quarter, having made the whole circuit of the heavens, it arrives again at the line from the west. This revolution is very irregular, but its mean period is twenty-seven days, seven hours, forty-three minutes, eleven and a half seconds. The difference between this period and that of a lunation, or the interval which elapses between two successive changes, may be thus explained.

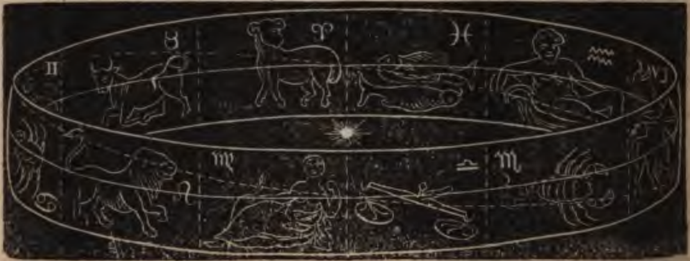


In this figure, E represents the earth, C the moon in its orbit o p, at change; S the sun in the ecliptic e e; and * a star. From this position, the motion of the moon is from C and a line joining the earth and star, toward p. In the period mentioned above, it will have passed through its whole orbit, and arrive by o, to the line E * at C. During this period, the sun has apparently been constantly moving from S eastward toward s; so that the moon will require a farther advance toward p, to overtake it; consequently, the change will take place somewhere eastward of C, with the moon, say at the point c, and the sun at s. The time then which is required for the moon to move from C to c, is to be added to the above period, when we shall have the period of a lunation. This time, at a mean rate, is 2d. 5h. 0m. 51½s. which added as above, makes the lunation 29d. 12h. 44m. 3s. Were these motions perfectly uniform, a very simple calculation would show the exact place of the moon in its orbit, at any time, and the precise moment of its conjunction with the sun. But as this is not the case, the subject is one of much perplexity, and has required the most careful and patient observations of the astronomer from year to year, for the construction of *Lunar* and *Solar* tables, from which the moon's places and its conjunction with the sun may be calculated.

The different phases exhibited by the moon may be represented in a manner well calculated to explain the nature of the subject, by means of a candle, which may represent the sun, and an apple or ball held in the hand by a string, for the moon. Being provided with this simple apparatus, stand as far as convenient from the light, and hold out the apple towards it. Your head now represents the earth, and the apple the moon between it and the sun, as at change. In this position you can see no part of that side of the apple which is illuminated by the candle. So with the moon; at the change, we cannot see it on account of its dark side being towards us. Now, holding your arm steady, turn yourself slowly round from right to left; or, as the expression is, against the sun, and you will see a portion of the illuminated side in the form of a thin crescent, representing the moon as it is first seen after the change. A little further, or one quarter round, and the crescent figure becomes semicircular, the circular edge being that next the candle, at the right, and the straight line which makes the other edge on the left. This represents the moon in its first quarter; a little farther, and the straight edge becomes convex, the figure assuming a gibbous appearance. As you turn your back to the light, carry the apple a little higher than your head, or you will have an eclipse, which we do not want just yet. Now, with the whole illuminated side toward you, it represents the moon at the opposition, or full. Turning a little farther, the right hand side, which before opposition was circular, becomes less so, and the figure is again gibbous, the circular edge being as before, that next the light, but on the opposite side. A little farther, and it is semicular again, representing the moon in its last quarter, Still farther, and the straight edge becomes concave, which makes the figure a crescent, which as you turn farther grows thinner, and finally disappears. Now all these changes have been produced in the same manner as those of the moon, of which you may convince yourself by carefully observing its appearance through a whole lunation, and noting the position of the sun at the time of observation; recollecting, however, that the sun is at an immensely greater distance from us than the moon.

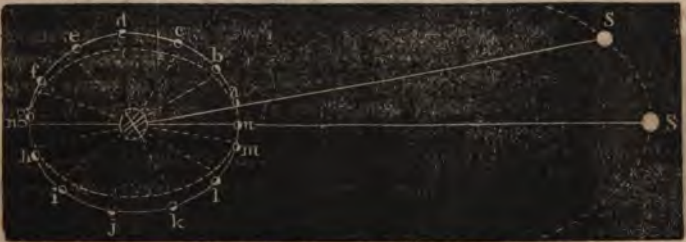


The manner in which the different phases of the moon are produced, is also exhibited in the annexed diagram, where the figure at S, on the right, represents the sun, the figure at E the earth; the small circle of figures M, N, &c. about it, the moon in different parts of its orbits; and the larger circle m, n, &c. the moon as it appears in these positions seen from the earth. You will do well to make use of this diagram in connection with observations on the moon itself through a whole lunation. Commencing at change, the moon cannot be seen on account of its dark side being toward the earth: its position at this time is represented at M, in the inner circle, and its supposed appearance at m, in the outer one. In about three days, the moon will have moved east, from this position, and may be seen as new moon after sunset, in the position represented at N, with the crescent form represented at n, continuing its progress eastward from the sun the earth and sun at change, unless the sun at the same time happens to be at, or very near one of them; nor can the earth be between the sun and moon at the full, unless the sun be at one of the nodes. This subject is not one of those most easily understood at first; yet I think, with the help of one or two diagrams, we shall find no difficulty with it. The following one represents the the position of the moon's orbit as referred to the ecliptic.

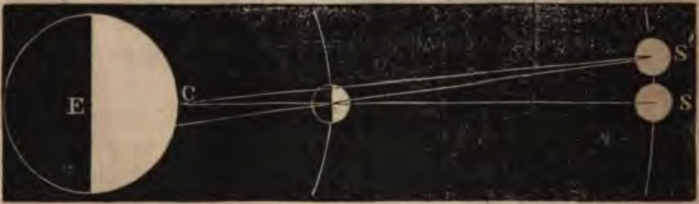


Here, the circular belt seen in perspective, or edge-wise, represents the ecliptic, with about 6° of the sphere on each side of it—the ecliptic being represented by the white line running along the middle of it throughout, and the moon's orbit by the dotted line which crosses it at the division between ♈ and ♓ at one node, and between ♍ and ♎ at the other. The first is the place of the moon's ascending node, and the other, the place of its descending node. As the places of the nodes are constantly moving backwards on the ecliptic, it is necessary to say that the diagram represents their places for the 12th of December, 1838. By referring to Nodes, you will find the subject explained in a very simple manner.

The greatest distance of the moon's orbit from the ecliptic, or at the point on the left between ♊ and ♋, and on the right between ♐ and ♑ as measured on the sphere, is about 5° 49′. From this, it appears that if the sun be at its greatest distance from the nodes at the time of change, the moon must pass 5° 49′ above or below it;—above, at that part represented to the left hand; and below, at that to the right. As the sun, in its apparent annual path, describes the whole circle of the ecliptic, it must be at or very near the nodes, at the time of change, at least twice in the year. For example: suppose the sun to be passing from ♓ toward ♈ at the time of change, and is not eclipsed; before the next change, it may have passed the node at ♈, but cannot have passed it so far but that some portion of the moon's disc will eclipse that of the sun. We can explain this more fully by another diagram.



Here, the curve a, b, c, &c. represents the moon's orbit, and the dotted curve the ecliptic. The nodes, or points, where the two curves cross each other, are represented at n, n, and the straight line joining them, the line of the nodes. That part of the curve running from n, through a, b, c, d, e, to n, represents that half of the moon's orbit which lies north of the ecliptic, and that part which runs from n, through f, g, h, i, j, to n, that half which lies south of it. For convenience, we will suppose that the diameters of the sun and moon are each constantly equal to 30′, or half a degree, in which case it is evident that the two semi-diameters of both are also equal to 30′; consequently, any circumstances that may place their two centres at this distance from each other, must cause the two discs apparently to touch, and when within this distance, to overlap each other. When the two centres are brought to coincide, the eclipse must be total. We will now consider the plane of the ecliptic as extended beyond the moon's orbit, so that the sun may appear as at S. Commencing with the moon at n, to the right, it is evident that in this position, its centre must lie between the centre of the earth and that of the sun, and that at the instant of change, the sun must be totally eclipsed at that part of the earth's surface which lies between its centre and that of the moon. To cause a total eclipse to some part of the earth, it is not necessary that the centre of the sun be exactly in a line with the moon's node, as may be seen by the following figure, where E represents the earth, M, the moon, and S, the sun. In these positions, the circumstances of the eclipse are as detailed above. We will now suppose the sun to be a little eastward of the node, as at S: in this position it is evident that at C, the eclipse will be partial, as but a small portion of the moon's disc overlaps that of the sun, while at c, it will be central and total. Referring again to the other diagram; suppose the moon at n, in the opposite node, at the full, it would then pass through the centre of the earth's shadow; and as the earth's disc, as seen from the moon, is always nearly four times as large as the sun's, it would remain for some time totally eclipsed to all parts of the earth to which the moon is at the time above the horizon. We will now suppose

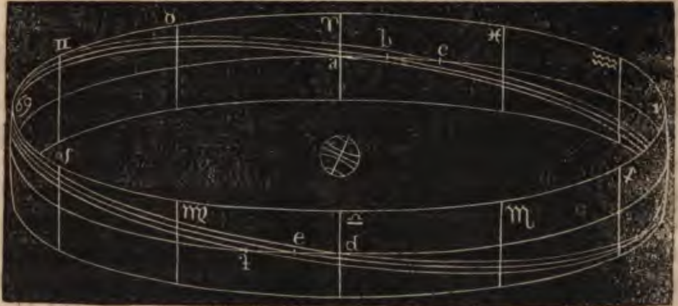


the next change to happen when the moon is at a, and the sun at S, having in the interval of a lunation moved forward or eastward in the ecliptic. Here the moon's centre, as seen from the earth, must be above the sun's. Still the sun may be partially eclipsed to some part of the earth. This, of course, depends upon the distance from the node, at which the change takes place. If this is so great as to cause the moon's centre to be 30′ above the sun's, the two discs will apparently touch; if less than 30′, there will be an eclipse, and if more, there will not be one. From this period, the moon's distance above the sun, at each successive change, represented at b, c, d, e, increases until it takes place at c; after which it diminishes toward n, at the opposite node, where, as you already understand, one eclipse at least must happen. After this, the position of the moon is below that of the sun, and its distance at the changes f, g, h, i, j, increases to h, and diminishes to n, accordingly.

You now understand that to produce a solar eclipse, it is necessary that the moon's change takes place when the sun is within a certain distance of one of the nodes. The limit of this distance is about 17°. We will suppose the moon to change at j, and that the distance from the node is just within this limit, and barely sufficient to cause an eclipse: at the succeeding full, the moon will be within the distance of the other node necessary to cause a lunar eclipse, the limits for which are about 12°. By the time it returns to change, the sun will have moved forward in the ecliptic, and the change will take place near a, but still within 17° of the node. Consequently, under these favorable circumstances, three eclipses, two of the sun and one of the moon, may happen when the sun is passing near this node, and the same may be said with regard to the other; and consequently there may be six eclipses, four of the sun and two of the moon, in a year. We shall presently see that in some cases, there may be seven—an additional one of the sun. If we suppose the first eclipse at j, to take place nearer the node, the moon at the succeeding full, may still be within 12° of the other, and be eclipsed. But the next change may take place more than 17° from the node, and there will be no eclipse; and as the same circumstance may occur as the sun passes the other node, there will be four eclipses in the year. From all that has been stated, you may see that the number of eclipses that may happen in a year, varies from two to six, according to circumstances. We will now suppose that six eclipses are to happen as above, and that the first, at j, takes place on the first of January, or soon after. The first three will take place in the month of January, and the last three in June and July following. Toward the end of the year, as the sun approaches n, another eclipse may happen near j; but before the succeeding full the year will be completed, so that the greatest possible number of eclipses that can happen in one year is seven. For further particulars relating to the phenomena, see Eclipse.

As this part of our subject is intimately connected with the position of the moon's orbit, with regard to the ecliptic, we will now consider other phenomena, which depend on the inclination of the planes of the two circles to each other. Those who are old enough may recollect that seven or eight years ago the moon did not pass the meridian at some periods of a lunation, so near the zenith as it now does, or so far from it, at others. At that time the greatest north declination of the moon was about 5° 49′ less than that of the sun on the 21st of June; and its greatest south declination as much less than that of the sun on the 21st of December. At this time, (1836–7,) the greatest declination of the moon each side of the equinoctial, exceeds that of the sun by about 5°.

Suppose the moon's ascending node to be at the first point of Aries, as represented in the diagram, page 92; we see that the northern half of its orbit lies north of that half of the ecliptic which is north of the equinoctial, and the southern half, south of the southern half of the ecliptic; consequently, when the moon comes to the meridian while in that part of its orbit represented at the division between ♊ and ♋, it must be 5° farther north than the ecliptic: and when it passes the meridian while in the opposite part of its orbit, it will be 5° 49′ farther south than the ecliptic. We will now suppose the position of the nodes reversed—the descending node at the first of Aries, and the ascending node at the first of Libra: it is evident from the diagram, that the northern half of the moon's orbit would then lie south of the northern half of the ecliptic, and that the southern half would lie north of the southern half of the ecliptic, and that the moon in the most northerly part of its orbit, would be 5° 49′ south of the ecliptic, and in its most southerly part, 5° 49′ north of it. Now, the moon's nodes are constantly moving backwards on the ecliptic, and this motion is called the regression of the nodes.



It may be explained by the preceding diagram, somewhat similar to the former.

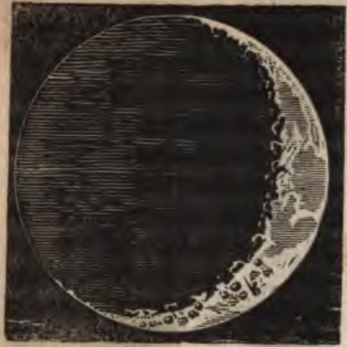
Here, the belt represents the ecliptic, and a portion of the sphere as before: the moon's ascending node is represented at a, and the descending node at d. As the moon revolves in its orbit about the earth. it does not describe a circle lying constantly in the same plane, but a spiral line, by which it crosses the ecliptic successively at points farther west. Suppose that in December, 1838, it crosses the ecliptic at a: at the next lunation, in January following, it will cross at a point 1° 35′ further west, as at b; and the ascending node is now considered as removed from a to b, while the descending node is removed from d to e. At the next lunation, the ascending node will be still further west, as at c, and the descending node at f. This motion is sufficient to reverse the position of the nodes once in about nine and one third years. Seven years ago, then, or nine years previous to December, 1838, the moon's declination at the extreme north and south points of its orbit was not so great as it will be at that time, by more than 10°. Eighteen years and two hundred and twenty-five days previous to December 12, 1838, the ascending node was at the first of Aries, and the same may be said of all previous periods of the same length, the period in which the place of each node goes through the whole circle of the ecliptic, being 18 years and 225 days.

Another phenomenon closely allied to this, is the Harvest Moon. You have probably noticed that for a few nights succeeding the full, about the last of September, or beginning of October, the moon rises but a few minutes later on each succeeding evening. The same effect takes place at some period of every other lunation; but as it does not happen at the full, it is unnoticed. It always takes place as the moon crosses the equinoctial from south to north, at which time its declination north increases most rapidly. We have seen, in the course of this work, that in our latitudes, stars at and within a certain distance of the north pole never set, that just without this limit they disappear below the horizon perhaps for an hour or two, and rise again. Still further south, they continue for a shorter period above the horizon; that is, the diurnal arc decreases as the distance from the north pole increases, untill we come to a region about the south pole that never rises. Celestial bodies situated in the equinoctial, continue twelve hours above and as long below the horizon. As one half the moon's orbit lies north, and the other south of the equinoctial, the moon must continue longer above the horizon, in one part than in the other. In its revolution about the earth, its motion eastward is such as to bring it to the meridian about fifty minutes later each successive day, at a mean rate; and consequently, if it continued invariably at the same distance from the pole, it would also rise fifty minutes later each day; but, as in one part of its revolution it is advancing north and remaining longer above the horizon each succeeding day, it follows that the difference between the times of its rising on one day and that of the next, must be less than this fifty minutes. Under the most favorable circumstances, as when the ascending node is at or near Aries, when the declination of both kinds is greatest, the moon's daily motion northward in one part of its orbit, is sufficiently rapid to reduce this difference to about twenty-five minutes. Perhaps you may understand the subject better by supposing the moon to have no other but this motion northward, so that its meridian passage would be the same each day. In this case, each successive rising would take place about twenty minutes earlier. In the opposite part of its orbit, when the moon's motion southward is most rapid, it would in the same case rise twenty minutes later each day. The moon's motion northward is most rapid about the time of its crossing the equinoctial from south to north, and most rapid southward when it crosses it from north to south. The former takes place about the time of full moon, in September and October, when the moon rises in our latitudes about 25 minutes later for a few evenings successively; and the latter at the full moon in March or April, when the risings take place about seventy minutes later for a few evenings. See Diurnal Arc.

We have seen (article Earth,) that the sun, when in that half of the ecliptic north of the equinoctial, continues constantly above the horizon at the north pole, and constantly below it when in that half south of the equinoctial; for the same reason, the moon in the northern half of its orbit constantly illuminates the north pole, continuing above the horizon during fourteen diurnal rotations. As the moon must be opposite the sun at the full, it must also be north of the equinoctial when the sun is south of it; consequently, the full moon must always be above the horizon at that pole to which the sun is below it.

To form an idea of the nature of the moon, as to its structure and its condition in the universe, it will be necessary to consider the appearances it exhibits when examined with the telescope. You have seen *the man in the moon*, and when told that this luminary was an immense globe something similar to the earth, you have, no doubt, rightly conjectured that the appearance is owing to causes similar to those which so beautifully diversify the surface of the earth. Fortunately, the telescope places the matter beyond doubt, by showing us what we know to be mountains with their ridges, peaks and precipices, and plains, vallies and cavities, and what may perhaps be seas and oceans. We have seen that at the first and last quarters, the line of intersection of the enlightened, with the dark part of the moon, is straight, and at all other times elliptical. If the moon's surface were even, this line would appear smooth and well defined, but if uneven, it would appear rough and broken. We will now commence with the new moon, considering it somewhat in detail, and then pass on to the quadrature, full, &c. when we shall find these appearances such as to leave us no longer in doubt as to the general structure of the moon's surface.

Here is a representation of the moon, as it appears with the tel-



escope, about four days after change. We here find that the phase is not divided from the dark part by a regular line, but that the parts run into each other, the confines being cut up, notched, and broken throughout. In the dark part are seen luminous points, and in the phase dark spots, and from their situation, with respect to the direction of the sun's rays, we conclude the former to be the tops of mountains just enlightened by the sun, and the latter cavities which, lying below the general level, are not yet within the reach of its rays. By degrees, the phase extends towards these luminous points, and they are at last incorporated with it. Inside the cavities, also, the sun's rays first reach that side next the dark part, and by degrees the whole becomes enlightened. Just within the phase, are seen crooked luminous lines, with broad dark shadows on the left side; the appearances being such as would be produced by mountainous ridges casting their shadows on the side opposite the sun. This conjecture is confirmed, as the moon advances in its orbit, by which the sun's rays strike this part more perpendicularly, and the shadows disappear. You will do well to remember the situation of as many of these places as you can, so as to recognise them again as they appear after the full. New points, ridges, and cavities, with their shadows, successively appear and disappear as the moon approaches its first quarter, when its appearance is somewhat as represented at the top of the next page.

Here, similar changes constantly take place. By considering the relative position of the sun and moon, you may see that in

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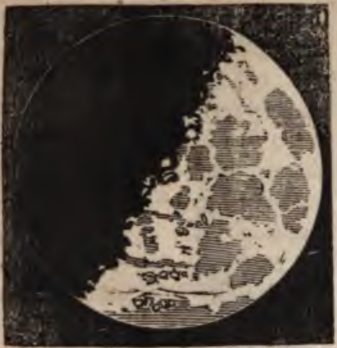
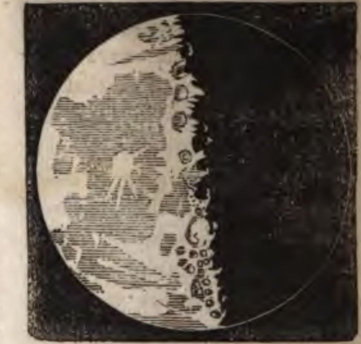
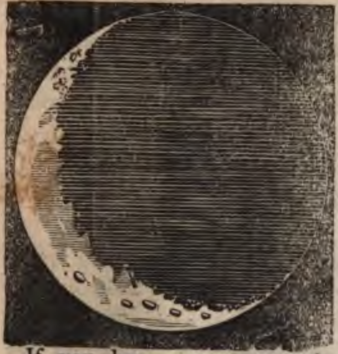


the right, or west part of the phase, the sun must be perpendicular, and consequently there can be no shadows. This part, therefore, appears tolerably smooth and even, the rough and ragged appearance being constantly confined to the intersection of the phase with the dark part. At the full, all becomes smooth, or nearly so, one side of the disc being always a little broken, because we cannot be exactly between the sun and moon, unless in case of eclipse; consequently, the whole illuminated side is not turned towards us. When the moon is in the north part of its orbit, at the full, the upper edge appears broken, and when in the south part, the lower edge. Hitherto, the shadows of mountains have appeared on the left hand side, and of cavities on the right, the sun being to the right. Now the case is to be reversed; as after the full, the sun will be to the left of the moon. We will now consider the moon in its last quarter.



If you can now recognise any of the points, ridges or cavities which you saw before the full, you find that their shadows are cast on the opposite side, for the obvious reason, that the sun now shines upon them from the opposite quarter. As you probably now understand the subject, it is not necessary to dwell on it.

We will therefore only represent the moon as it appears about four days before the change.



If you have never seen the moon at this period, I can safely promise you an enjoyment you have little conception of. You see the new moon, as it were, turned about; and though there may seem little in this to excite your admiration, yet you will find it better worth seeing than you imagine. I cannot stop to embellish the subject; but if you are not habitually an early riser, just try it for once: find, by the almanac, when the moon rises about two hours before the sun, and on that morning rouse yourself in time to see it, and I think you will consider the trouble well paid for.

Though the moon, as a satellite in the system, considered without reference to its relation to the earth, may be considered of secondary consequence; yet next to the sun, it is to us the most important object in the heavens. It is the principal cause of the phenomena of the tides, and its distance at any time from a star, situated near its orbit, enables the sailor to determine the position of his ship in whatever part of the wide ocean it may be. Perhaps you may think there can be no great difficulty in measuring the distance from Boston to Albany by means of a chain or otherwise; yet no measure of this kind, however carefully made, can give the distance with such accuracy, as that deduced from a nicely conducted observation of the distance of the moon from a star, or the occultation of a star by the moon. From what we have seen in article Earth, it is only necessary to know the difference of time between two places, to enable us to ascertain their difference of longitude. As the moon revolves in its orbit, it is constantly approaching some stars and leaving others, which lie in or near its path. In tables calculated from long and careful observations on the motion of the moon, its distance from those stars is given at short intervals for every day. Suppose we wish to know the distance, westward, of Albany from Boston, and that it is known that the moon will be just 22° east of Aldebaran when it is midnight at Boston. If, at Albany, we now observe the motion of the moon from the star, we shall know that when it arrives at this distance from it, that it is midnight at Boston. We have now to notice the exact time at Albany, which will give us the difference of the time between the two places, and consequently the difference of longitude. As our object is only to know something of the principles of such operations, which you see are very simple, I shall not enter into their details, which are long, though not intricate, and require careful and close calculation.

Many astronomers have entertained the opinion that the moon has neither atmosphere or water, so that animal life, as it exists on the earth, cannot be supported there. Still, as it may not be a necessary condition of animal existence, that it be supported exactly like ours, there is nothing unreasonable in supposing that it may be inhabited, if it has no atmosphere. The idea that so large a surface as that of the moon lies a desert waste, is at least unpleasant, and, as we feel strongly predisposed to think, improbable. It is by no means certain that the moon has no atmosphere, and I believe the opinion is now gaining ground that it has a very thin one.

As the moon revolves about the earth, it turns on its axis in such a manner as always to present the same side to us. To its inhabitants, if there are any, the earth appears much as the moon does to us, going through every variety of phase, from change to change, that we observe in the moon, and appearing about four times as large. When the moon changes to us, the earth appears full to them; the enlightened part of the earth always appearing of the same shape that the moon's dark part does to us at the same time.

By referring to Tide, you will learn the dependence of the phenomenon on the influence of the moon, and as its effects there are so obvious, it is not improbable that it exerts a similar influence on our atmosphere, having a closer connexion with the various changes of the weather, perhaps, than is at present understood.

N.

NADIR: that point in the sphere, directly under our feet, or opposite the zenith.

NEBULÆ: as generally understood, those dense clusters of stars, which, by their immense distance, are too minute to be distinguished as such by the naked eye, appearing as small, faint, misty spots, or clouds. By far the greater part of these objects cannot be resolved into stars without very powerful telescopes, and many are otherwise invisible; so we shall confine ourselves to the few visible to the naked eye, or with instruments of moderate power. The Pleiades, or seven stars, you are already acquainted with. This, though not strictly a nebula, is a compressed cluster, and is a good object for the most ordinary telescope. To the naked eye it exhibits six stars; but if you observe it with an ordinary spy-glass, you may see twenty or thirty, the number visible depending on the power of the instrument. The appearance exhibited with a power of 10 or 12, is represented at the top of the next page. About 16° southeast of Pollux, is a cluster much more dense than the Pleiades, which makes a nearer approach to nebulæ. To the naked eye it presents that confused or uncertain appearance which leaves one in doubt whether the stars are distinctly seen or not. A common spy-glass, with a power of

about 15, shows 10 or 12 stars, which appear like those of the first or second magnitude to the naked eye, and a great number of smaller ones. With a power of 60 or 80, these larger stars are doubled, trebled, and quadrupled, forming every figure and triangle in the whole range of geometry, exhibiting an appearance somewhat as represented in the picture at the top of the next column.

As no similar spot is near this, you will have no difficulty in finding it. Another cluster, or rather two, still more dense than the last, is in the constellation Perseus, 20° north of Almack, in Andromeda, and 14° east of Schedii in Cassiopeia. A low power is sufficient to distinguish many of the stars; but with a power of 60 or 80, it is a splendid object. If we look at the group forming Orion's sword, we readily discover four stars; and good eyes, with close looking, may see five or six. With a power of 12 or 15, the number seems increased to infinity, and near the middle or largest star, is seen a truly nebulous spot, which no telescope has yet resolved into stars, though it has been repeatedly examined with the greatest care, by Dr. Herschel, who probably exceeded all others in his means and assiduity for discovering all that can be known of this class of objects.

By using a high power, say 160, the large star becomes sextupled, and the nebula appears as here represented.

Another nebula readily distinguished by the naked eye, is in the constellation Andromeda, 6½° northwest of Mirach, and 1½° west of a star of the third magnitude. This is 'continually mistaken for a comet.' It has never been resolved into stars. With a telescope of low power, it appears somewhat as here represented.

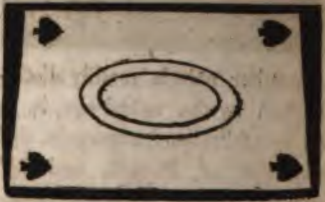
Another nebula, of rare and singular form, is in the constellation Lyra. Its appearance is that of a flat, luminous ring, from which this class has been called annular. Its position is 6½° southeast of Vega, (α Lyrae,) and 1¾° west and a little north of γ of the third magnitude, about midway between this star and β Lyrae, of the third magnitude, as represented at the top of the next page.

This is an interesting object, with a moderate power, appearing somewhat like the first of these figures. The other represents a nebula in the constellation Sagittarius, which is beyond the reach of ordinary instruments.

The broad belt or zone, called the Galaxy, or Milky Way, is in every part of it an interesting object for telescopes of every power; the smaller ones, showing us multitudes of minute stars, and the larger ones increasing the number to millions.

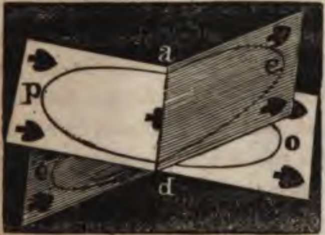
NIGHT: the interval which elapses between sunset and sunrise.

NODES: those points in the orbit of a planet, or the moon, where it crosses the ecliptic. These points have already been repeatedly referred to, and I hope have been understood; yet, that nothing may be wanting to render the subject as simple and plain as possible, we will give another illustration of it. In the first place, it is necessary to understand what is meant by the plane of a circle. I have endeavored to explain this, by reference to a round table, the edge of which is a circle, and the surface, its plane. All circles described on the table with a pair of compasses, lie in the same plane; two circles lying in the same plane may also be represented on a card thus.



We will suppose the outer

circle to represent the ecliptic, and the inner one an orbit; now, if one end of the orbit could be raised above the surface of the card, and the other depressed below it, the centres still remaining the same, it would no longer lie in the plane of the ecliptic, but would be said to *incline* to it, and the two circles seen edge-wise would appear to cross each other at opposite points, one half the orbit lying below the ecliptic, and the other above it. We will now place two cards in such a position as to cross each other.



Here, the circle e e, represents the ecliptic, and the circle o p, an orbit, and the two cards on which they are drawn, their planes. It is evident from the figure, that the planes do not coincide, one half the orbit being below and the other half above the ecliptic—the two circles crossing each other at the points a d. Now, suppose a planet to be moving in the orbit from o through a to p, and from p through d to o: as it passes through the point a, it is said to be in ascending node, as it then ascends above the plane of the ecliptic; and when it passes through the point d, it is in descending node, as it then descends below it. The line joining the points a and d, is called the line of the nodes.

NORTH: one of the cardinal points.

NORTH POLE: that point in the sphere to which the north end of the earth's axis points. The position of this point is nearly marked by a star of the second magnitude in the constellation Ursa Minor, which is on that account called Polaris. The distance of this star from the true pole is little more than a degree and a half on that side opposite the star Alioth, in the tail of the Great Bear. This is commonly called the North Star. Its Arabic name is Alruccabah.

NOVEMBER: the eleventh month of the year, on the 22d of which the sun enters the sign Sagittarius. About the first of this month, the constellations Pegasus, Aquarius and Pisces Australis, come to the meridian at 9.

O.

OCCULTATION: may be understood as signifying an eclipse of a star by the interposition of a planet, or of a planet or star by the moon. Occultations of stars by the moon, afford the most perfect means of ascertaining the longitude of places on the earth.

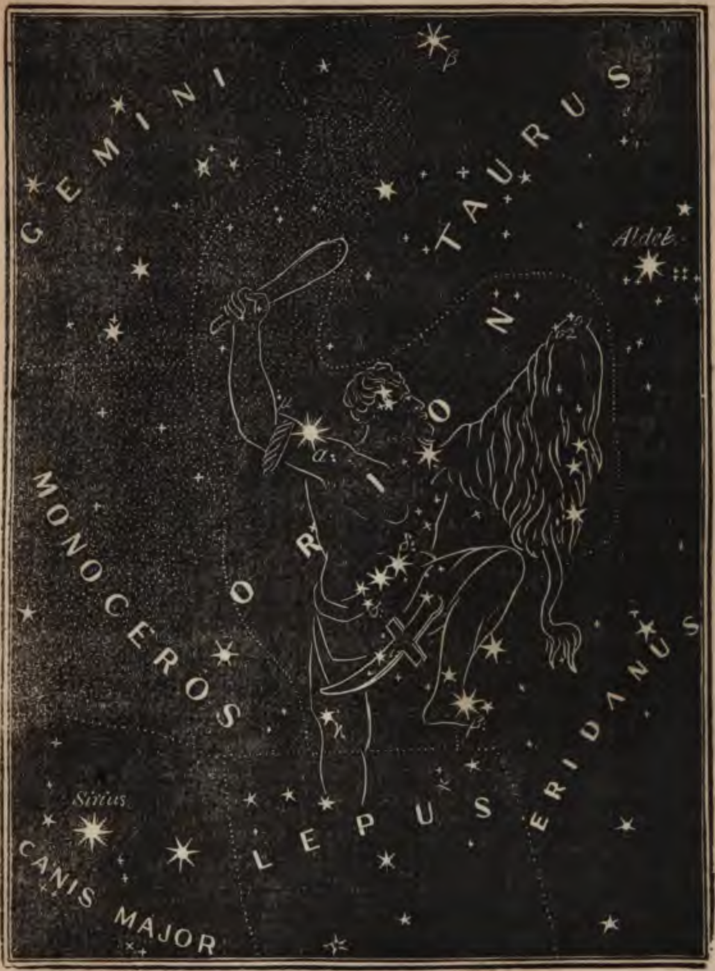
OCTOBER: the tenth month, on the 23d of which the sun enters Scorpio. Aquarius comes to the meridian at 9, this month.

OPHIUCHUS: the Serpent Bearer, a constellation situated north of Sagittarius. Its south part is represented on the picture with Scorpius.

OPPOSITION: of a heavenly body, signifies that it is in that part of the heavens opposite the sun. Thus the moon at full, is in opposition; and February 1, 1837, Jupiter will be in opposition, passing the meridian at midnight.

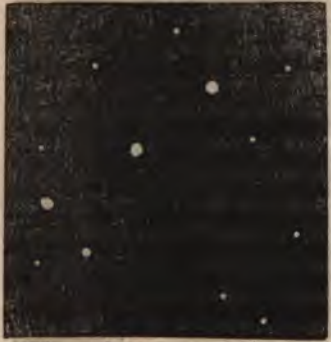
ORBIT: the path in which a planet revolves about the sun, or a satellite about its primary.

ORION: a constellation situated between Taurus and Canis Major. It is readily distinguished by the beautiful group of stars called the Yard L, as well as by the unrivalled splendor of the whole constellation. Indeed, this region is the most beautiful in the starry sphere. Orion, Taurus, Auriga, Gemini, Canis Major, and Minor, Lepus, Columba Noachi, and part of Eridanus, forming one vast neighborhood, which for beauty and magnificence, is unparalleled in either hemisphere. Here, also, at present is the planet Jupiter, contributing its own splendor, and thus rendering it unusually interesting. Mars will also be in this region during the latter part of the year 1836.


GEMINI
β
TAURUS
Aldeb.
ORION
α
MONOCEROS
β
γ
κ
Sirius
CANIS MAJOR
LEPUS
ERIDANUS

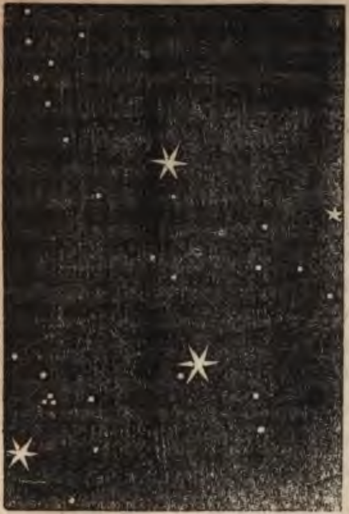
The most northerly star of the Yard L, or that nearest Pleiades, comes to the meridian at 9, January 23d. This star is very near the equinoctial on the south side, and will help you to learn the position of this great circle.

As we shall take the Yard L as a starting point, we will here give a representation of it, with some of those stars near it, which may be seen with a common opera-glass.

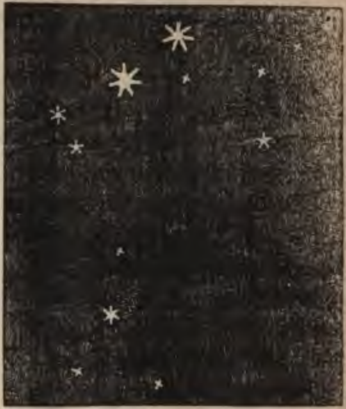


We will now commence with this group, and endeavor to become acquainted with its brilliant neighbors. On maps, the group forms Orion's belt. The most northerly star is marked δ, the middle one ε, and the most southerly one ζ. The two first are of the second magnitude, and the last, of the third. They are severally a little less than a degree and a half distant from each other; the small star rather less than 1° southwest from ζ is of the fourth magnitude; 7° north and a little west of δ is Bellatrix, of the first magnitude; and 7½° east and a little north of this, is Betelgeuz, of the same. About 5° northwest of this, and 4° northeast of Bellatrix, is a group forming Orion's head, containing two stars of the fifth, and one of the sixth magnitude. This spot is a beautiful object for a telescope, with a power of 60. It is also interesting as being one of the first groups ever examined with this instrument. It was first thus examined by Galileo, who has given this representation of it in his 'News from the Stars.' See top of next page.

Nearly 16° northwest of Bellatrix, is Aldebaran, of the first magnitude in Taurus, forming, on



maps, the Bull's southern eye. It is situated at the eastern point of a handsome group called Hyades. 13½° northwest of Aldebaran, is Pleiades, or *the seven stars*, a representation of which you will find in article Nebulæ. About 9° southwest of δ, in the Yard L, is Rigel, of the first magnitude. About 4½° south of ε, is a group forming Orion's sword; this has been described in article Nebulæ, but that you may readily find the curious nebulous spot mentioned there, I will here give a representation of its situation.



The group situated about 16° south of the Yard L, consisting generally of stars of the fourth magnitude, forms the constellation Lepus, (the Hare.) Still farther south, about 32° from the Yard L, is the constellation Columba Noachi, (Noah's Dove,) containing one star of the second magnitude, and several smaller ones. Seen with a spy-glass, it is a beautiful constellation. 22° southeast of the Yard L, is Sirius, the largest star in the sphere, in the constellation Canis Major. 25° nearly northeast of Sirius, and nearly 28° east of Betelgeuz, is Procyon, of the first magnitude in Canis Minor; and about 4½° northwest of this is Mirzam, of the third magnitude. About 23° nearly north of Procyon, is Pollux, of the second magnitude, in the constellation Gemini, and about 4½° northwest of this is Castor, of the third magnitude. You will find this described in article Binary Star. Nearly 17° northeast of Aldebaran is a star of the second magnitude, in the point of the Bull's northern horn; and 17½° north and a little west of this, is Capella, (the little Goat,) of the first magnitude, in the constellation Auriga.

We have now found the situations of some of the principal stars in the neighborhood of Orion, and you will find no difficulty in ascertaining their places in the sphere. When you are able to point them out readily, you will easily learn the names and places of the others by the help of maps.

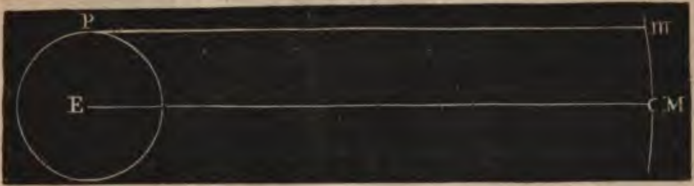
Orion figures in fabulous history as a mighty hunter, who boasted that there was no animal he could not conquer, when he was immediately stung in the foot by a scorpion, which caused his death. He was then made a constellation by being placed in the heavens. This constellation was very anciently named, and is mentioned in the Old Testament. Orion is represented on maps as a hunter, with a huge club in his right hand, in the attitude of assaulting the Bull.

P.

PALLAS: see Asteroides.

PARALLAX: until you have made farther progress in astronomy, than this little book is intended for, you will have little use for this term. Still, as it is of great importance in *practical* astronomy, and is easily understood, it may be well to become acquainted with it now, and save the trouble of learning it hereafter.

It will be necessary to refer to a diagram.



Suppose the time of the moon's rising is required for a certain place, and that this place is represented at P. In the first place, the rising must be computed for the earth's centre, E, at which time the moon, as you see by the figure, is at M. It is evident, that at this position the moon will be below the plane of the horizon at P, and cannot be seen until it has risen from M to m. The time, then, found as above, must be corrected by adding as much time as is required for the moon to rise from M to m, which, in our latitude, is something more than two minutes. The distance from M to m is the moon's horizontal parallax, and as measured on the sphere, is about one degree.

PAVO: the Peacock, a southern constellation, within the circle of perpetual occultation.

PEGASUS: the Winged Horse, a constellation north of Aquarius, part of which is represented in the picture of Aquarius and Pisces. Markab comes to the meridian at 9, October 25. 16½° east of it, is Algeneb, of the second magnitude, and 14° north of it, is Scheat, of the second magnitude. 14½° east of this, is Alpherat, of the first magnitude, in the constellation Andromeda, the whole forming nearly a square, which will be easily recognised. The large star, south of Markab, near the horizon, is Fomalhaut in Pisces Australis. Markab is one of the stars frequently used in nautical astronomy for ascertaining the longitude. Algeneb and Alpherat are situated very near the equinoctial colure.

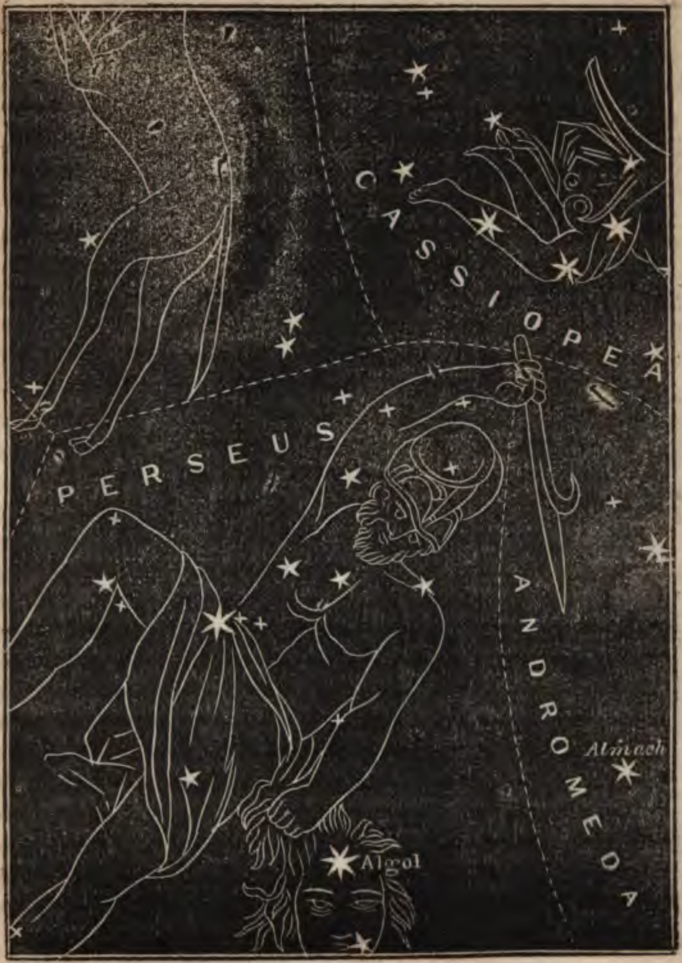
PERIHELION: as the orbits of the planets are not perfect circles, but more or less elliptical, there must be one point in each orbit which is nearest, and another which is farthest, from the sun. That point which is nearest the sun is called the perihelion point, and the other the aphelion.

PERIOD, is the time in which a planet or satellite moves through its whole orbit.

PERIODICAL: returning at stated periods.

PERSEUS: a constellation situated north of Taurus. When Pleiades comes to the meridian, December 30, you may see two stars, one of the third, the other of the fourth magnitude, 8° north. The former is in the left foot of Perseus, the latter 2° west of it. Little more than 8° north of the former, is a star of the third magnitude, and 9½° west, and a little north of this, is the periodical star, Algol, or *Medusa's Head*, situated nearly on a line from this star to Almach in Andromeda, from which it is distant nearly 17°. As the period of Algol is short, you may, by careful observation, see the variation in its magnitude. It comes to the meridian at 9, December 21, at which time it is near the zenith. Its position is so near the circle of perpetual apparition, that it remains but little more than five hours below the horizon. The position of the stars of this constellation are represented in the picture opposite.

In fabulous history, Perseus is represented as a son of Jupiter. He was thrown with his mother into the sea, and was rescued by a fisherman, who carried him to the king of the Cyclades. His genius and courage excited the envy of the king, whose friendship he endeavored to regain, by engaging to present him with the snaky head of the Gorgon Medusa. As he was a favorite with the gods, they equipped him, for the perilous enterprise, with a


CASSIOPEA
PERSEUS
ANDROMEDA
Almach
Algol

helmet which rendered him invincible, wings at his feet, and a dagger of diamonds. Having succeeded, and returning with the bloody head through Ethiopia, he discovered Andromeda chained to a rock, to be devoured by a sea-monster. This monster he changed to stone, by showing him Medusa's head. He then liberated Andromeda, and afterwards married her. After death, he was placed in the heavens. See Andromeda. Perseus is represented on maps with the Gorgon's head, which he holds by its snaky locks in his hand.

PERIODICAL STARS, are those which undergo a variation in their apparent size or brilliancy. The period of variation of some of these stars is short, of others, very long; the shortest is that of the remarkable star Algol, in the constellation Perseus, which goes through its changes in two days twenty hours and forty-eight minutes; at its greatest brilliance, it appears as a star of the second magnitude; at its least, of the fourth. Some of these stars are seen by the naked eye in one part of their period, while in another, they cannot be seen with the telescope. The history of some periodical stars is very remarkable; some have suddenly shone out with a brilliancy equal to the largest planets, and after a while have disappeared, and have never been seen again. Astronomers have endeavored to account for these changes, by supposing one part or side of a periodical star luminous, and the other dark, and that by a rotation on their axes, they present to us alternately their light and dark side. Some suppose these stars to have immense planets, which in one part of their orbits pass between them and our system, and thereby intercept their light. This is all little better than *guess work*, and may be considered accordingly.

The following table, from 'Herschel's Treatise on Astronomy,' exhibits the length of the periods, and the variation in magnitude, as far as known, of the most remarkable of these stars.

TABLE OF PERIODICAL STARS.

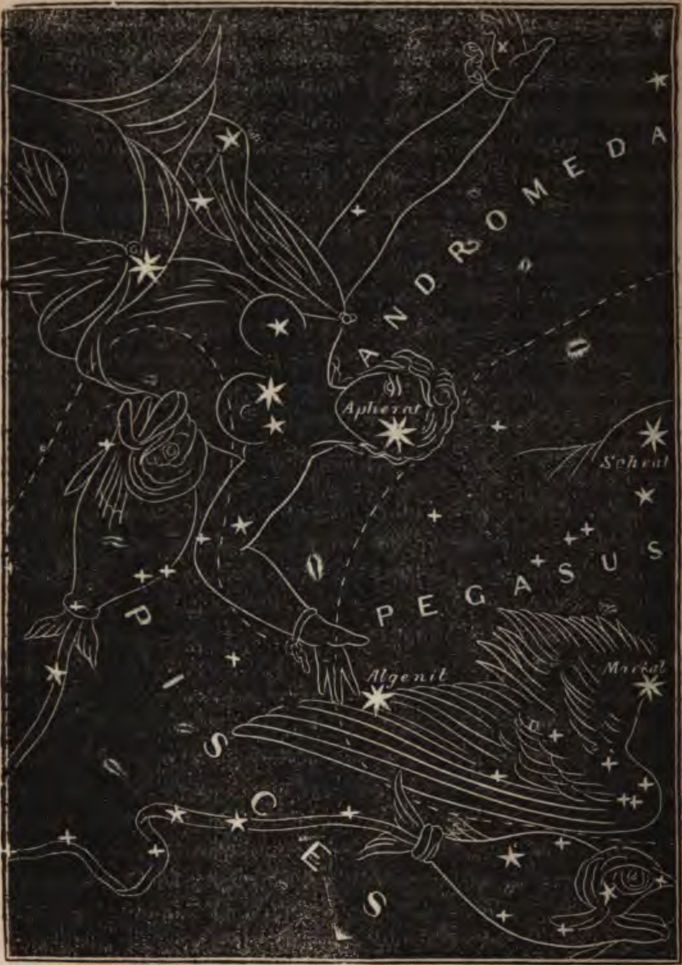
STAR'S NAME.	PERIOD.			VAR. OF MAG.		
β Persii, Algol	2 days,	20 hours,	48 minutes	2	to	4
δ Cephei	5	8	37	3.4		5
B Lyræ	6	9	0	3		4.5
η Antinoi	7	4	15	3.4		4.5
α Herculis	60	6	0	3		4
* Serpentis	180			7		0
o Ceti, Mira	334			2		0
χ Cygni	396			6		11
367 B* Hydræ	494			4		10
34 Fl. Cygni	18 years			6		0
420 M. Leonis	many years			7		0
κ Sagittarii	ditto			3		6
ψ Leonis	ditto			6		0

PHASES, denote the shapes of the luminous portion of the moon, in different parts of its orbit, or during an eclipse: as also the appearances of Venus and Mercury, which are similar to those of the moon. The visible portion of the sun, during an eclipse, is also denominated a phasis.

PHŒNIX: a southern constellation, only the north part of which can be seen in the United States. It has one star of the second magnitude, which may be seen near the horizon, as it passes the meridian at 9, November 14. It is 22½° southeast of Fomalhaut. This star is interesting on account of its being near the circle of perpetual occultation. It continues about four hours above the horizon.

PISCES: the Fishes, one of the constellations of the zodiac, situated between Aquarius and Aries. Its largest stars are of the fourth magnitude. Their situation you may learn from the picture on the next page.

PLANET: a wandering star. This is the definition as understood by the ancients, who, having no telescope to aid their astronomical inquiries, saw nothing


ANDROMEDA
Apherat
Scheat
PEGASUS
Algenib
Markab
PISCES

in the appearance of the planets to distinguish them from the true stars; but as these continued fixed in the same position relative to each other, while the planets were constantly moving, they called the latter wandering stars, the Greek word from which planet is derived, signifying a wanderer.

If at any time we note the distance and direction of Jupiter from any of the stars, we shall find, after a few days, that it has changed its place; and by continuing our observation through a number of years, we shall find that it revolves in an orbit about the sun. At present, we find it in Gemini; in a year, it will have moved so far eastward as to be in Cancer; in another year, it will be in Leo; and so on, until at the end of about twelve years, we shall find it in Gemini again.

There are eleven planets, seven of which have been known from the earliest times: the others have been discovered since the commencement of the present century.

The sun and planets, with their satellites, having a certain mutual relation to, and dependence on, each other, are collectively denominated the Solar System: the sun (called in the Latin language, '*Sol*,') being the great source of light and heat to all, and the common centre about which all the other members of the system revolve. We have seen that the earth revolves in an orbit about the sun, in a period called its year, and that it has a rotation on its axis, which produces the phenomena of day and night. The same may be said of the other planets, which revolve in different periods, and by a similar motion about their own axes, have each their days and nights. The periods of those which are nearest the sun are short in comparison with those which are farthest from it. Thus the year of Mercury, which is the first planet from the sun, is only eighty-eight days, while that of Uranus, which is the last in the system, is more than eighty-three years.

In the following table are exhibited the distances of the several planets from the sun, the periods of their revolution in their orbits, (in which the hours and minutes are in general omitted,) their diameters, and their periods of rotation on their axes.

Names of the Planets.	Distance from the sun in millions of miles.	Length of years in days.	Diameter in miles.	Diurnal rotation.		
				Days.	Hours.	Minutes.
Sun	———	———	883,000	25	14	8
Mercury	37,000,000	88	3,224	15	—	—
Venus	68,000,000	225	7,687	—	23	21
Earth	95,000,000	365.5	7,911	—	24	0
Mars	144,000,000	687	4,189	—	24	39
Vesta	225,000,000	1,326	———	—	—	—
Juno	252,000,000	1,593	———	—	—	—
Ceres	263,000,000	1,681	———	—	—	—
Pallas	265,000,000	1,686	———	—	—	—
Jupiter	490,000,000	4,333	89,170	—	9	56
Saturn	900,000,000	10,759	79,042	—	10	16
Uranus	1,800,000,000	30,687	35,112	Unknown.		

Some of the planets have secondary ones, or satellites, revolving about them; one of which, the moon, you are already acquainted with. The others can only be seen with the telescope. The earth has one, Jupiter four, Saturn seven, Uranus six. No others are known.

As the planets with their satellites are particularly described in other parts of the work, it only remains to consider their probable nature and condition, and their importance in the great scale of the universe.

When we consider the relation to the sun, the seasons, the days, and nights, and the size of these bodies, we are forcibly struck with the general resemblance they bear to the earth, and come to the conclusion that they answer a similar end in the universal economy; that they probably have their continents, islands, oceans and seas; their vegetable worlds in all their beautiful profusion; their numberless races of animals, in all their infinite variety and distinctions; and their nations, which rise one after another, and pass away. To the astronomer, who finds some of them many times larger than the earth, there is absurdity in the idea that they are to be considered as desert wastes, having no definite purpose in creation save mere existence. They also have their atmospheres; at least, such is the conclusion, and in this case we are not left entirely to conjecture, the appearance of some being such as can be accounted for on no other supposition. The dark belts of Jupiter, for instance, which sometimes appear as straight and well-defined lines drawn across its disc, at others, broken up, and running into each other, and again disappearing entirely, leave us in no doubt as to their being clouds, which at one time show us the direction of constant winds, at another, the confusion of opposing currents, and at another, the calm and tranquil atmosphere. Here, then, without any assistance from the imagination, we get something like a distant glimpse of its sunshine and storms; and as the immediate purpose of these phenomena on the earth, is the support of vegetable existence; we conclude that the seasons of Jupiter are not without their seed-time and harvest; and having once adopted this supposition, the conclusion that all the planets, and perhaps the sun itself, are inhabited, is irresistible.

The planets, in their relation to the sun, are further considered in the article, Solar System.

PLEIADES: the seven stars, a small group in the constellation Taurus. Its position is too well known to require any direction for finding it; its telescopic appearance is represented in article Nebula.

POLAR: something relating to, or situated near, the poles.

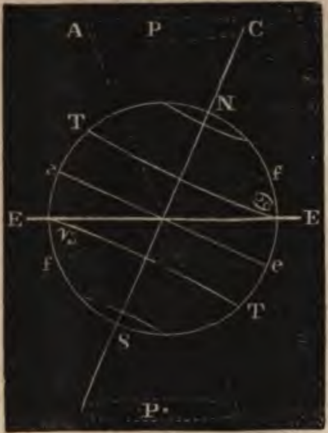
POLARIS: the Pole Star. This star is not situated exactly at the true pole, but is distant from it 1° 33′ 36″, on that side next the constellation Cassiopeia. In article Precession, you will find that the earth's axis is slowly, yet constantly, changing its direction with regard to the sphere; and that the effect of this is to alter the positions of the stars with respect to their direction from the earth; the axis of the earth constantly pointing to new successive points in the sphere. In consequence of this motion, Polaris is now approaching the true pole, in a direction which will cause it to pass within half a degree, on the side next Auriga; after this its distance from the pole will increase, until after a lapse of more than 12,500 years, when its distance from the pole will be about 47° 15′. After this, it will return, and at the end of 25,868 years from the present time, will occupy its present position near the pole, which is given above for January 1, 1837.

You will find this star represented with the constellation Ursa Minor; and having once ascertained its position, you will not readily forget it. See Ursa Major.

POLES: those opposite points in the sphere, toward which the axis of the earth points. The position of the north pole is nearly marked by the star Polaris.

PRECESSION: of the equinoxes. I am not sure that I shall be able to explain the nature of precession, so that you will understand it perfectly; but the subject is of too much importance to pass without notice. We have seen, (article Ecliptic,) that the constellations are constantly moving eastward of the signs; or rather, that the signs, by being referred to the point in the equinoctial where the sun crosses it from south to north, follow its slow yet constant motion west, leaving the constellation to the east. From this, it would seem that the ecliptic is continually shifting the position of its plane, so that the points where it is crossed by the equinoctial are moving round on the latter circle from east to west. But we are now to consider the ecliptic stationary, and endeavor to transfer this motion to the equinoctial, where it properly belongs. As the poles of the earth, and the corresponding ones of the sphere, are those opposite points just 90° from the equator and equinoctial; so the poles of the ecliptic are those in the sphere just 90° from this circle, and as the inclination of the two planes to each other is 23° 28′, so the two poles are 23° 28′ distant on the sphere. The effect of precession here is a motion of the pole of the equinoctial about that of the ecliptic. A common peg-top furnishes a most simple and beautiful illustration of this motion; we will therefore adopt it, using one a little modified in shape, the better to suit our purpose.

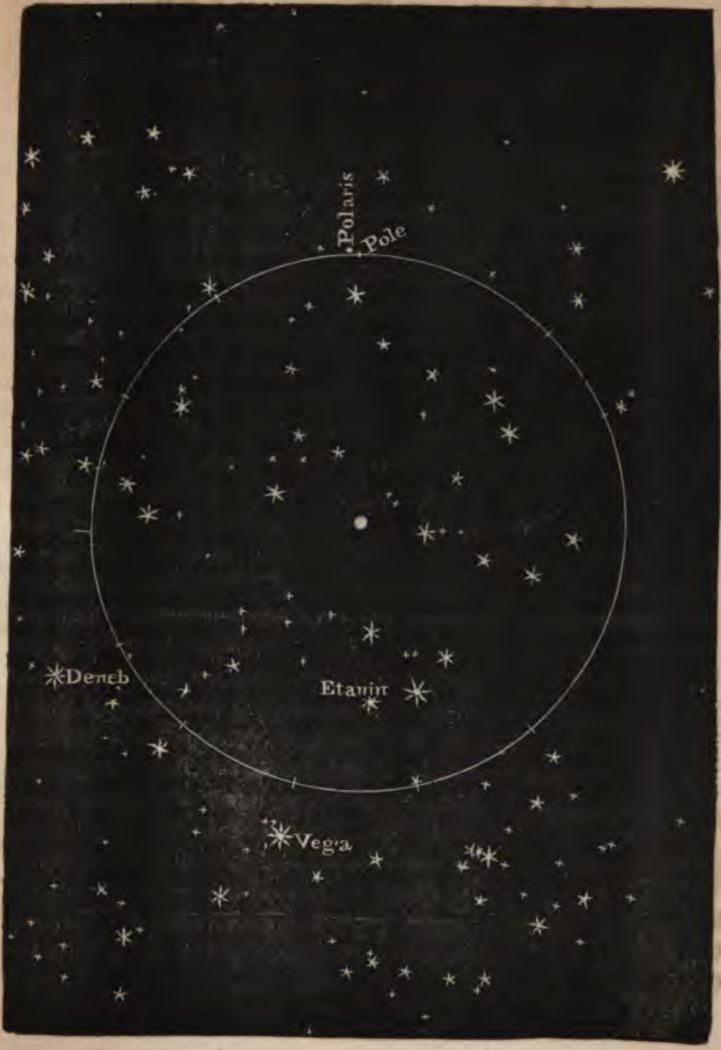
Here is one of a spherical shape, to represent the earth, with a spindle through its centre for its axis, and parallel lines drawn about it for the equator, the tropics, and the polar circles—the ends of the spindle being the poles. If we now set it in motion, we shall find that for a short time before it stops, the two poles move round in small circles, having for their centres two points, one above and the other below the centre of the sphere. If, during this motion, we hold about the top a small wire hoop in a horizontal position, so that its centre shall coincide with that of the sphere, the hoop will represent the ecliptic, and the two points above and below its centre, its poles. Now, while the earth turns swiftly on its axis, its poles describe circles similar to those of the top; and as the poles of the sphere are designated by those of the earth, they must follow this motion describing circles about



the poles of the ecliptic. We will now use a diagram where E E, represents the ecliptic, seen edgewise, permanently fixed; the points, P P, its poles; the circle, the top moving freely with a uniform motion in the centre of the ecliptic; C N S, its axis with the poles describing circles about the points, P P; N, the north, and S, the south pole, e e, the equinoctial; T ♋, the tropic of Cancer, and ♑ T, the tropic of Capricorn. It is easy to see, that the poles may describe the circles about the points, P P, while the axis still maintains the same inclination to the plane of the ecliptic; and that the point, where the equinoctial crosses the ecliptic, must move along it in a corresponding direction. Suppose the north pole moving from C toward A:—the point in the ecliptic where it is cut by the equinoctial is also moving toward E, on the left. When it has moved to P, the crossing points will be at E E, and when to A, they will be reversed, the equinoctial being as represented by the dotted line, f f. As the motion of the poles about those of the ecliptic, is from east to west, so the sun must cross the equinoctial at points successively further west, and this constant shifting of the crossing point is called the precession of the equinoxes.

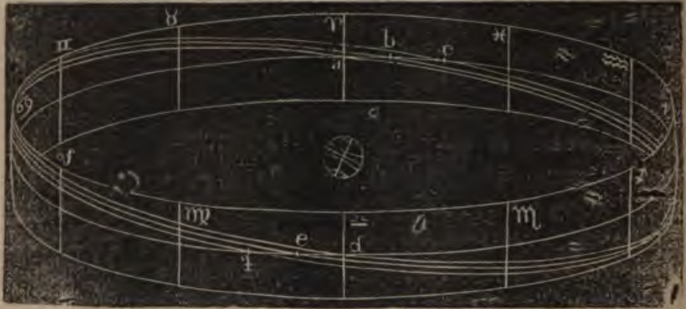
The motion of the north pole of the sphere, among the stars, is shown in the opposite picture by the circle, the centre of which is the pole of the ecliptic.

As here represented, the motion of the pole westward is to the left, by which you see that it must pass still nearer Polaris, its


Polaris
Pole
Deneb
Etanin
Vega

least distance being about 29′. The period in which it describes the whole circle is 25,868 years. Passing Polaris, it approaches a star of the third magnitude in Cepheus, and will pass it in about 2,350 years, at the distance of about 3°. In about 8,500 years, it will pass the star Deneb, of the first magnitude, in Cygnus, at the distance of about 7°. In about 12,000 years, it will pass the beautiful star Vega, in Lyra, at about 5°.

The apparent motion of the Sun, by which it crosses the equinoctial successively at points farther west, may be explained by reference to this figure, which represents a broad belt, or zone, in which are twelve equal divisions, which may represent the places of as many constellations referred to the equinoctial. Aries being situated between the divisions marked ♈ and ♉, Taurus between ♉ and ♊, and so on. The central line running through the middle of the zone is the equinoctial: and the spiral line crossing it between the divisions at ♈ and ♓, and the divisions at ♍ and ♎, is the Sun's path. We will now suppose that on the 21st of March, in a given year, the sun will cross this line from the right toward the left, at the division marked ♈. and goes on describing its annual circle. When the Sun arrives again at the equinoctial, March 21st of the next year, it is at a point a



little to the right of the division ♈ toward ♓. Thus it goes on each succeeding year, describing its spiral path, and crossing the equinoctial nearer at each revolution, to the division ♓, the crossing point, or first of Aries, and consequently all the signs constantly moving toward ♓. This motion is indeed very slow, and requires 2140 years for the zero point to move from ♈ to ♓. Since the time that the zodiac was first divided into twelve parts or constellations, this motion has carried the first point of Aries beyond ♓, and it is now between ♓ and ♒.

Thus you see that the signs are constantly moving to the west; but as they arrive at the meridian at the same period of each succeeding year, the motion appears to belong to the constellations, which apparently move east.

In 12,934 years, the first of Aries will have moved from its position in the constellation Aries, to the constellation Libra, in the opposite point of the sphere; in 25,868 years, it will have completed the tour of the whole circle, and will be again in Aries.

PRIMARY PLANETS, are so called to distinguish them from the satellites, which are called secondary.

Q.

QUADRATURE: a celestial body is said to be in quadrature, when it is 90° east or west of the sun.

QUARTER: from the change to the quadrature, the moon is said to be in its first quarter; from this to the full, in its second quarter,—and so on.

R.

RAS ALGETHI: a periodical star in the constellation Hercules, with a period of 60 days, varying from the third to the fourth magnitude.

REFRACTION: see air.

REGULUS: a star of the first magnitude in the constellation Leo. This star is situated near the ecliptic, on the north side.

RETROGRADE: could we see the planets from a position in the sun, we should always see them moving among the stars from west to east; but as we see them from a position which is also in motion, they sometimes appear to move from east to west. The latter motion is called retrograde.

RIGHT ASCENSION, is the distance, reckoned eastward, on the equinoctial, of a celestial body from the first point of Aries. It is generally estimated in time—15° being equal to one hour, and so on.

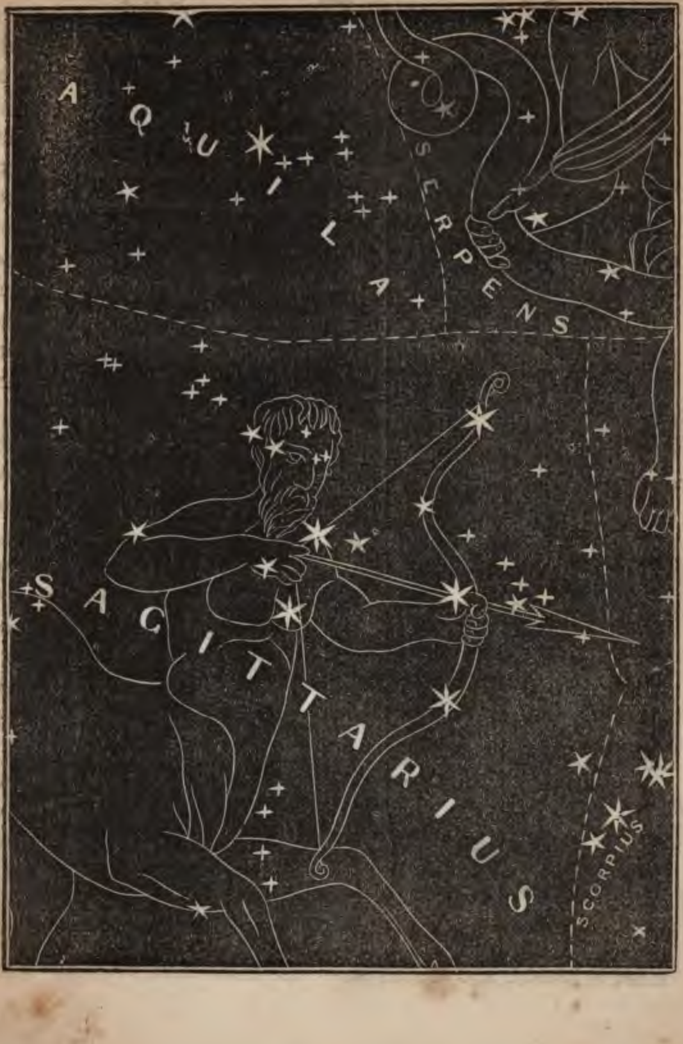
ROTATION: a motion which may be illustrated by reference to a carriage wheel, which as it rolls along the road, has a rotation, or motion about its own centre, the centre being called its axis of rotation. This is that motion of the planets which, by turning every side successively to and from the sun, produces the phenomena of day and night. See Earth.

S.

SAGITTARIUS; the Archer, a constellation of the zodiac, situated between Scorpius and Capricornus. It contains five stars of the third magnitude, and twelve of the fourth,—the principal ones being mostly situated in the northwest part. These come to the meridian at 9, about the middle of August, at which time they will extend from about 12° to 27° above the southern horizon. Their positions will be most easily learnt by referring to the picture.

SATELLITES: small secondary planets which revolve about their primaries, the most prominent example of which is the moon. See moon and planets.

SATURN: the tenth planet from the sun, and by far the most remarkable one in the system. In addition to the great number of its satellites, it is encompassed with a broad ring, or rather two rings, lying in the same plane, one within the other, and coinciding very nearly with the plane of the planet's equator. The appearance of the planet and its ring, as seen with a powerful telescope, is represented by the cut at the top of the next page.

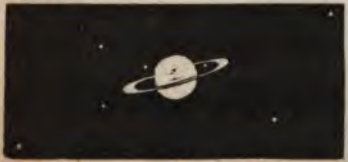

AQUILA
SERPENS
SAGITTARIUS
SCORPIUS

To the naked eye, Saturn appears as a star of the first magnitude, shining with a rather faint and reddish light. With a telescope, it is seen attended with seven satellites, and with dull obscure belts across its disc. The rings are supposed to be of nearly the same materials as the planet, being opaque, and shining by the reflected light of the sun. The distance from the equator of the planet to the inner ring, is 19,090 miles: from the inner to the outer edge of this ring, is 17,175 miles; the interval between the rings is 1,791 miles; from the inner to the outer edge of the exterior ring, is 10,573 miles; the thickness of the rings, as seen edge-wise, is thought not to exceed 100 miles. To the inhabitants of Saturn, if there are any, these rings must present a magnificent spectacle: let us imagine the rainbow, greatly magnified in breadth, and of such materials as to reflect, in the absence of the sun, as intense a light as that of the moon, and we shall have some idea of the appearance of these rings, as seen from considerable distances north or south of Saturn's equator. With their seven moons, and this immense double arch, spanning the skies from the eastern to the western horizon, the nights of Saturn must present a scene the most grand and sublime in the universe.

Spots which have been seen on Saturn's surface, moving across its disc, indicate a rotation in ten hours sixteen minutes. The rings have also a rotation in ten hours twenty-nine minutes. Its revolution about the sun is performed in rather less than thirty years.

At present, Saturn is in the constellation Virgo, and at the middle of September, 1836, will be about 12° N. E. of Spica, and will set about an hour and three quarters after the sun: being too near the horizon at dark, for favorable observation with the telescope. By the middle of December, it will rise about three hours and a half before the sun, and afford a good opportunity for observing it. A telescope of very high power is necessary to show the interval between the two rings. With a power less than 500 or 600, the rings appear as one; still, a power of from 100 to 200 shows it as a most beautiful object. With this power, some of the satellites can also be seen. Its position, at the time, will be in Libra, 22½° east, and a little south of Spica. It will continue in this constellation through the year, entering Scorpius about the middle of January, 1838; but will return by its retrograde motion again to Libra early in April. Toward the latter part of October, it will again enter Scorpius.

This planet, with its satellites, appears somewhat as here represented.



In almanacs, Saturn is represented by this character ♄.

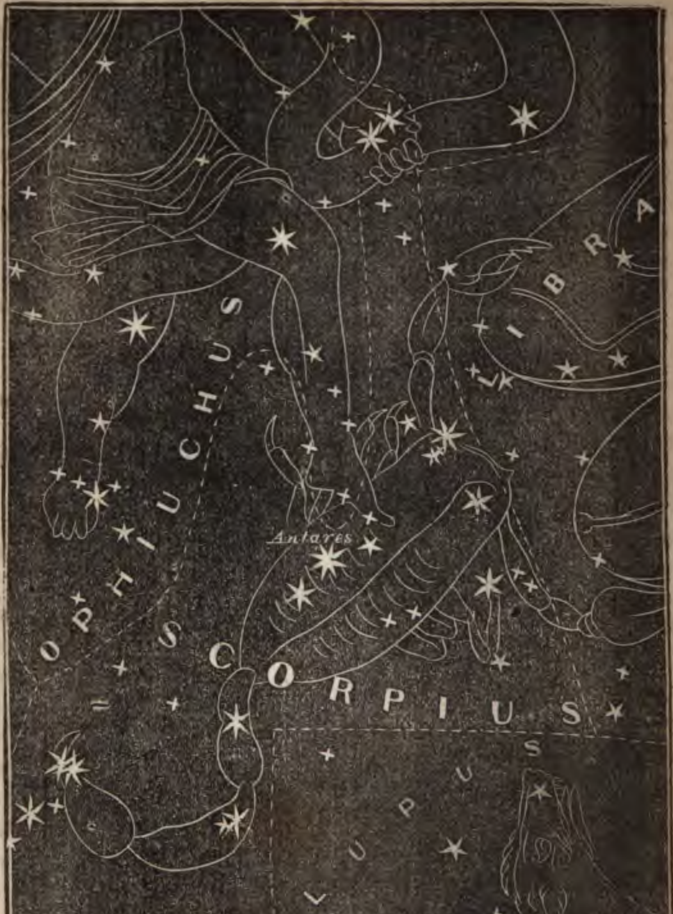
SCORPIUS: a constellation of the zodiac, situated between Libra and Sagittarius. Antares, a star of the first magnitude, comes to the meridian at 9, July 11. The appearance of this constellation is too striking to render any further assistance necessary for ascertaining its place, and the position of its stars, than by giving the picture on the next page.

SERPENS: the Serpent, a constellation, situated north of Scorpius. The north part of it is represented in the picture with Hercules.

SIRIUS: a star in Canis Major, and the largest of the sphere.

SOLAR: relating to the sun.

SOLAR SYSTEM: the sun and planets, with their attendant satellites, and the comets, or at least those that are known to return periodically to the sun, having a certain relation to each other, as it were a kind of family connexion, distinct from other celestial bodies, are collectively denominated the Solar System.


OPHIUCHUS
LIBRA
Antares
SCORPIUS
LUPUS

An illustration from 'Herschel's Treatise,' is well calculated to give an idea of the relative magnitudes and distances of the several parts of our system. 'Choose any well levelled field, or bowling green. On it place a globe two feet in diameter; this will represent the sun; Mercury will be represented by a grain of mustard seed, on the circumference of a circle 164 feet in diameter for its orbit; Venus a pea, on a circle 284 feet in diameter; the Earth also a pea, on a circle 430 feet; Mars, a rather large pin's head on a circle of 654 feet; Juno, Ceres, Vesta and Pallas, grains of sand, in orbits of from 1000 to 1200 feet; Jupiter, a moderate sized orange, in a circle nearly half a mile across; Saturn, a small orange, on a circle of four-fifths of a mile; and Uranus, a full sized cherry or small plum, upon the circumference of a circle more than a mile and a half in diameter.'

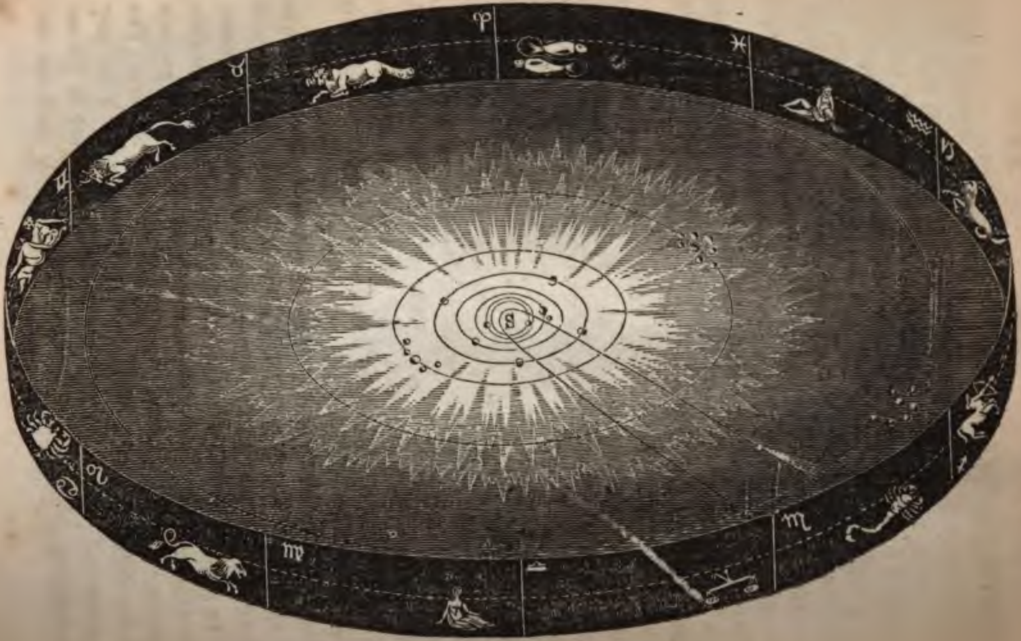
As the different members of this system are particularly described under the proper heads we shall only give a representation of the system generally, as it would appear if the planets and their orbits could be seen somewhat edge-wise, from an immense distance beyond the farthest planet.

SOUTH: one of the cardinal points.

SOUTH POLE: that point in the sphere opposite the north pole.

SPHERE: may be considered as the vast concave in which the stars, by their immense distances, appear placed. In astronomy, this sphere is imaginary, like the circles used in astronomy, and is considered at an infinite distance; therefore, every circle referred to the sphere is considered as extending without limits. See the following article.

STAR: we have now come to a class of celestial bodies which we have frequently mentioned, without once touching upon their individual natures, or the purpose they answer in the universe. The subject is one at which we may well hesitate, it being in its nature and extent, such as the



THE SOLAR SYSTEM.

most powerful mind involuntarily shrinks from, as beyond its utmost grasp.

On a fine evening, such as our New England winters afford in perfection, we have but to look upwards, when we behold countless hosts of glittering points studding the dark back-ground of sky, and affording a scene which, however much accustomed to is always dwelt upon with wonder and admiration. These points, from their always maintaining the same position relative to each other, are denominated 'fixed stars.'

For convenient reference, the stars have been, as we have seen, arranged into constellations, and distinguished into different classes, according to their apparent magnitudes. The first arrangement may be understood by reference to Constellation, and the last to Magnitude. In contemplating the stars, their great number naturally engage our first consideration. Of those visible to the naked eye, it is less, perhaps, than is generally imagined—probably not exceeding 15,000; but when we look at the results of the telescope, the imagination becomes bewildered, and we can only add figure after figure to the number, without being able to get at any definite conception of the magnitude of the amount. In examining the Milky Way with a telescope, which embraced at one view a space not so large as the Pleiades, Doctor Herschel saw 50,000 stars pass the field in one hour. This zone is considered but one of an innumerable number of similar shoals, scattered throughout the sphere, the most of which, by their great distance, appear even with the most powerful instruments, but as faint whitish clouds. If they all consist of stars, which we have no reason to think improbable, what can be the whole number?

If we find it impossible to conceive the number of the stars, we shall be no less at a loss when we consider their distances. In article Sun, an attempt is made to get something like a comprehensive view of the magnitude and distance of that luminary. This distance we must use as our Gunter's chain, for measuring that of the nearest probable star; with this however, we can only measure our way toward, without reaching it. Astronomers with the most perfect, and nicely adjusted instruments, have carefully observed many of the larger stars, from year to year, in order to discover an apparent motion in them, which would result from the annual motion of the earth. To understand this, it is necessary to refer to the effect produced on the direction of a near object, by our moving toward the right or left of it. Let us stand a dozen yards from a fixed post, on its south side; if we now move a yard to the right, we find that the post is not now exactly north of us, it bears a little to the west of north; if we now resume our first position, it bears north again, if we now move to the left, it bears east of north. If we try the experiment with a distant mountain, we shall find that our moving a few yards to the right or left, does not alter the direction of the mountain, which still remains north; we must move a mile or two, before the difference in its bearing, becomes perceptible. If we make use of the astronomer's instruments, we can measure this difference when extremely minute; if with these we observe an object exactly north of us, at the distance of 100,000 yards, and then move a yard to the right, we can discover that the bearing of the object is altered a little to the west. Again if the object be due north, but at an unknown distance, and we find with our instruments, that by moving a yard to the right or left, we cannot alter the apparent bearing of it; we know that it must be more than 100,000 yards distant. To apply this method to measuring the distance of a star, suppose we observe the bearing of Polaris, when it passes the meridian, and find it due north; exactly half a year after this, the earth will have moved eastward to the right 190,000,000 miles, or the diameter of its orbit, from its former position. If we now observe the star and find its direction unaltered, we know that its distance must be more than one hundred thousand times one hundred and ninety millions of miles. It may be argued, that the star has not arrived to the meridian, at the last observation: this has been cared for, the exact time of its culmination may be computed, from the known motion of the earth in its orbit, and its diurnal rotation. This has hitherto been the result of all similar observations, on what are supposed the nearest of the stars, a result which places them at least beyond the distance of two hundred thousand times that of the sun from the earth, and how much beyond this we cannot know; the result also proves, that a space in the sphere of an extent equal to that of the earth's orbit, appears at this distance, a point without dimensions; that is, if a celestial body, equal in diameter to the earth's orbit, were placed in the sphere, it would appear but as a mere point, without any visible dimensions whatever. At this immense distance, it is certain the stars cannot shine by the reflected light of the sun, and the conclusion is, that they are themselves, the sources of that light, by which they appear so brilliant to us; that they are suns, in their own systems, and that they may be surrounded by planets, the common abode of animated nature. It has been proved, by proper experiments, that if the sun were placed at this distance, as a star; its magnitude would fall far short of Sirius. On the supposition, that the intrinsic quality or intensity of the light of Sirius, is similar to the sun's, it has been computed, that this star is about fourteen times as large as the sun.

It is stated in article Sun, that light reaches the earth in about eight minutes, after leaving the sun. If we suppose the nearest stars, to be just without the confines of the space, measured as above, the light we receive from them, requires more than two years after leaving them to reach us. It can be shown that to reduce a star of the first magnitude, to the sixteenth, it would be necessary to carry it to more than four hundred times its present distance; consequently, it is reasonable to suppose that stars of the 16th are at four hundred times the distance of those of the 1st—and what is the result? that a thousand years, are required for light to traverse this space. This is not the result of speculation; the most careful investigation, and the most candid and cautious reasoning, leads to such a conclusion; a conclusion, which leaves the wildest dreams of the imagination far in the back-ground. If there is ever an excuse for giving away to the dreamy speculations of fancy, such a subject, may be a proper one for indulgence. Suppose our telescopes capable of showing us the inhabitants of these distant worlds, in all the busy concerns of life; that we see them influenced by the passions and ambitions exemplified in the history of our world; in their private quarrels and public wars, and then to reflect that we are looking on a race, that has for ages been swept away; that those we now see engaged in scenes of rapine and violence, have slumbered in the repose and peace of their graves, for a thousand years.

It was the opinion of Doctor Herschel, and his reasoning has no appearance of exaggeration, that from the most distant nebulous shoals, that he has examined, light requires a million of ages to reach the earth.

The process, that has established this distance of the stars, from our system, also shows that their distances from one another, must be as great, except in a few very remarkable cases now to be considered. The star Castor furnishes an instance of two stars—*suns,* belonging probably, to one system. A telescope of considerable power shows this star double, the two individuals being nearly of equal magnitude; a long series of observations, has shown, that they revolve about each other, and hence the conclusion, that they belong to one system. Granting this, and that they are attended each by their planetary connexions; your imagination will require no assistance from notions of my own, in contemplating the condition of the inhabitants of such magnificent worlds. See Binary Stars.

Our subject is scarcely begun, yet the limits of this book, oblige us to leave it, referring you to such higher sources for information as you may meet with hereafter.

SUN: the great source of light and heat to the solar system, and the common centre about which all the planets revolve, and to which, in connexion with their own proper motions, they owe the alternations of summer and winter, day and night. Of all the heavenly bodies, the sun is most conspicuous, and apparently the most considerable. Its magnitude, perhaps, claims our first attention; but the better to obtain an idea of this, we will endeavor to get at its distance. The mean distance of the moon from the earth is stated at 240,000 miles, and the best way, perhaps, to estimate the magnitude of this, is to consider that of the moon itself. Its diameter is 2160 miles, or about a quarter that of the earth. When we consider how vast that portion of the earth appears, which can be seen from an elevated position, and at the same time, reflect on the diminutive speck it is, compared with the whole surface, we may conceive how immense this distance of 240,000 miles must be, when we find it sufficient to reduce the whole magnitude of the moon, to the small disc, which it shows to us. Sound is said to travel at the rate of thirteen miles in a minute; a body moving with this velocity, would require near half a month to reach the moon from the earth. The distance of the sun is 95,000,000 miles; to attempt to comprehend the magnitude of such numbers, is out of the question; we will therefore estimate the distance, by the time required by a body moving with the velocity of sound, to reach the sun from the earth, which would be more than fourteen years.

Light, instantaneous as it appears, which reaches the earth from the moon, in less than a second of time, requires more than eight minutes, to traverse the distance of the sun from the earth.

What, then, must be the magnitude of the sun, which is apparently as large as the moon, though at such an infinitely greater distance. Its diameter is stated at 883,000 miles from which its bulk is calculated to be 337,086 times as large as the earth; here again we are lost in numbers, and must have recourse to a larger standard. If the earth and moon, still maintaining their present distance from each other, could be placed, the earth in the centre of the sun; the moon would also be within its body at a point, but little more than half way, from its centre to its surface. Such, then, is the magnitude of the sun; and probably, as we have seen, of the smallest stars that glitter in the firmament.

When examined with the telescope, large black spots, are seen on the sun's surface, some of which have been found to be more than six times as large as the whole surface of the earth. These spots are not permanently fixed, but sometimes spread over its surface, like broken masses of clouds; they have all, however, a general motion from east to west, which indicates a rotation of the sun upon its axis; the period of this rotation, has thus been found to be twenty-five days, fourteen hours, eight minutes.

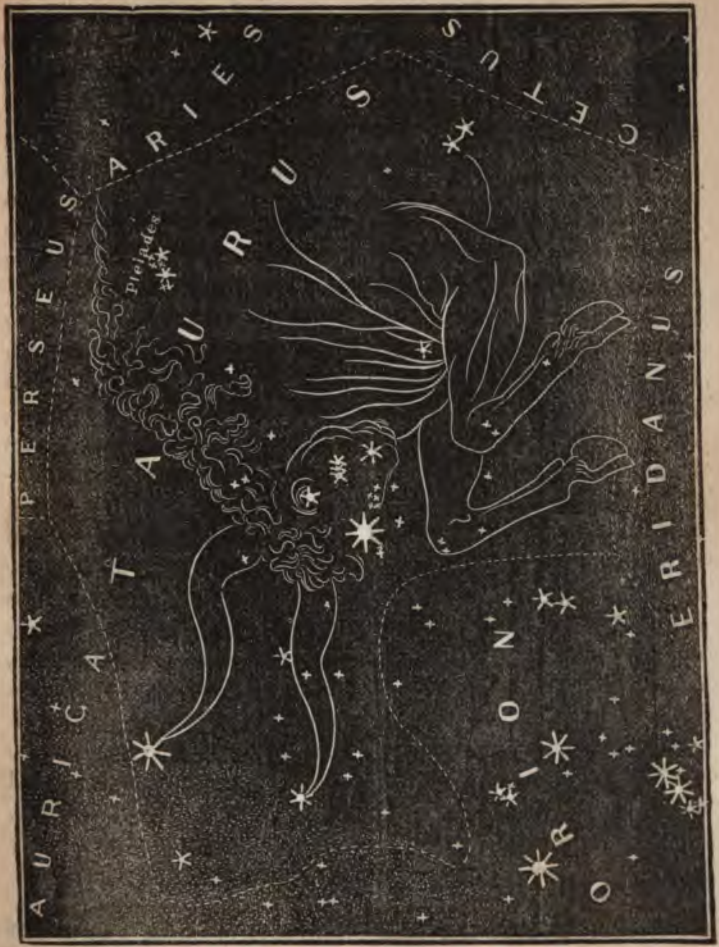
Many astronomers have supposed the sun habitable; but as their theories are almost purely conjectural, it is not worth while to waste time on the subject.

In almanacs, the sun is generally denoted by this character ⊙, and sometimes by a small circle of rays embellished with something like human features thus 🌞.

T.

TAURUS: one of the constellations of the zodiac, situated between Aries and Gemini. The principal features of this constellation, are considered in article Orion.

TELESCOPE: this instrument, so important in astronomy, was first used for celestial obser-


AURIGA
PERSEUS
ARIES
TAURUS
Pleiades
CETUS
ERIDANUS
ORION

vations by Galileo. We have not space for describing this instrument particularly; but will give an idea of what is meant by power. By this, is only meant the number of times an instrument magnifies an object in one direction: thus, if an object appears twice as long or broad, as seen with the naked eye, the telescope is said to have a power of two, and so on. As the moon's disc is about half a degree broad, such an instrument would make it one degree; and with a power of 180, the disc would be magnified to 90°, so that if the lower edge of it appeared to touch the horizon, the upper edge would be in the zenith. Very small instruments, with a power from 3 or 4, to 15, are sufficient for that most interesting branch of astronomy, the general study of the stars. For viewing the planets, and many other interesting objects in the heavens, high powers are requisite; but as these are somewhat expensive, few children enjoy the privilege of using them. As all have a curiosity for seeing the mountains, vallies and shadows on the moon, if you know of any gentleman in possession of a large instrument, go to him, when he is at leisure, and civilly ask him to favor you with a *look*, and I think he will not refuse; at all events, call on me at the North-End, when the moon is in quadrature, and you shall be gratified.

TIDES: the universal rise and fall of the waters of the ocean which generally occur twice in about 24 hours. We have seen, that all bodies mutually attract each other, with a force proportionate to their masses and distances; the tides are occasioned by this tendency of the earth to *fall* toward the moon. All bodies lying on the earth's surface, have this tendency to fall toward it, which is overcome, by the greater attraction of the earth; those bodies which lie on the side next the moon, are most attracted by it, and those which lie farthest, least. By this attraction, the earth may be considered as falling constantly toward the moon; and as the side next the moon may be said to fall fastest, this side, if it be fluid and free to move, will be drawn out, assuming a somewhat conical shape, while the other side of the earth, being less attracted, must fall slower, and as it were lag behind. Here, then, the water must also be drawn out in a direction opposite the moon; consequently, at the point directly under the moon, and at the point opposite, the waters of the ocean must be higher than at the intermediate space. As the earth turns on its axis from West to East, the moon appears to move from East to West, and consequently, these points of high water must constantly follow or be drawn after it. The sun also produces a smaller tide in the same manner; and when the moon is in conjunction, or opposition, the two tides coincide, forming a higher tide, than when the moon is in quadrature.

It may seem from the above, that the times of high water may be readily known, by adding a constant quantity to the times of the moon's meridian passage: this might be the case, were the moon always in the equinoctial, and at the same distance from the earth, and if it were not for the solar tides, which sometimes retard, at others accelerate, the lunar ones, and for local causes, as the currents of the ocean, the irregular shape of coasts, &c. all of which combined, render the subject one of great intricacy.

TRANSIT: when the planets Venus and Mercury, have their inferior conjunctions, when at or within a certain distance of their nodes, they pass between the earth and the sun, appearing like round black spots, crossing its disc; these phenomena are called transits.

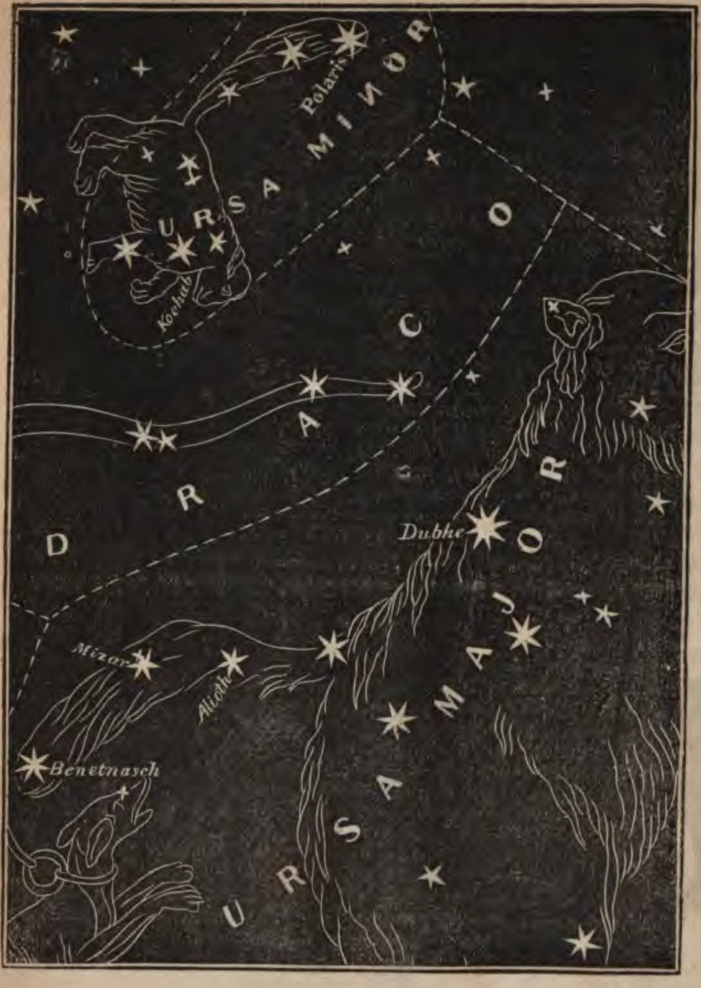
U.

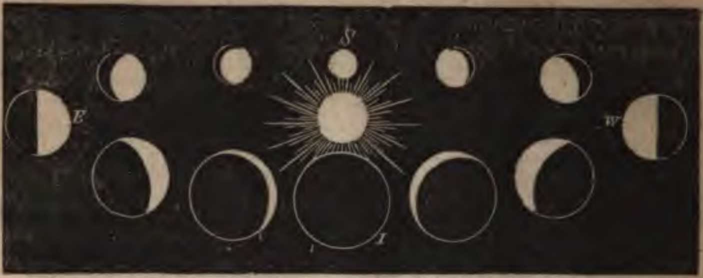
URANUS: the farthest planet in the system yet known, its orbit including those of all the others. This planet was discovered by Dr. Herschel, March 13, 1781. Its appearance is like that of a star of the 6th magnitude, with a faint bluish white light. A telescope, with a power of 200 or 300, is necessary to enable us to see its disc. It is supposed to be attended with six satellites, which were discovered by Dr. Herschel. This, it would seem, must be doubtful, as the younger Herschel says that 'two undoubtedly exist, and four more have been suspected.' The orbits of these satellites present a striking characteristic, very different from any other in the system: their planes, instead of nearly coinciding with the ecliptic, are nearly perpendicular to it, so that from the planet, the satellites in their revolutions appear to pass very near the poles of its sphere. From the great length of its period, the apparent motion of this planet among the stars is very slow. At present, it is in Aquarius, 20½° north, and a little west of Fomalhaut. Uranus is denoted by this character, ♅.

URSA MAJOR: the Great Bear, a constellation situated in the circle of perpetual apparition, north of Leo and Virgo. This constellation is perhaps more generally known, than any other in the sphere. The *Dipper*, every body knows; it is formed by 5 stars, one of the 1st, two of the 2d, and three of the 3d magnitude. The first comes to the lower meridian at 9, Oct. 24. This, and the star Mirach, 5½° south of it, are called the pointers, from their pointing out the situation of the pole star. See the picture.

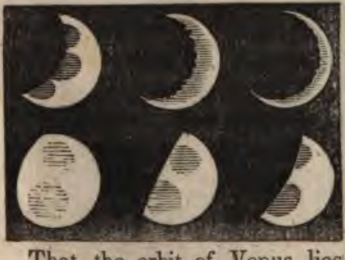
V.

VENUS: the second planet from the sun, and to us the brightest in the system. Its orbit lies between that of Mercury and the earth. The different phases which this planet exhibits to us in its revolution about the sun, are represented in the diagram at the top of the 146th page; where S, represents the superior conjunction of the planet with the sun; E, its greatest eastern elongation; I, its inferior conjunction; and W, its greatest western elongation. As Venus is 136,000,000 miles nearer to us, at its inferior conjunction, its disc then appears more than twice as large as at its


URSA MINOR
Polaris
Kochab
DRACO
Dubhe
URSA MAJOR
Mizar
Alioth
Benetnasch



superior conjunction. Its phases, seen from the earth, as it revolves through its orbit, are easily understood from the diagram. Those appearances are explained more in detail in article Mercury. It is needless to say, these phases can only be seen with the telescope. This planet generally appears marked by two or three large spots on its disc, as here represented.



That the orbit of Venus lies within that of the earth, is known from the fact that it is never seen more than 48° from the sun. A short time after its superior conjunction, Venus may be seen in the west, each day getting farther to the eastward from the sun, until at its greatest elongation, it becomes for a short time stationary; after which, its motion is westward toward the sun, until when near its inferior conjunction, it is lost in the sun's beams; during this time, it is called the evening star. After this, it may be seen west of the sun, rising before it, and constantly gaining a position farther west, until at its greatest elongation, it again becomes stationary; after this its motion is eastward toward the sun, until it is again lost in its beams: during this time, it is called the morning star. As you can never be mistaken as to the identity of this planet, I need not give any direction for finding it in the heavens.

VESTA : see Asteroides.

VIA LACTEA : the Milky Way, that immense luminous belt, which makes the whole circuit of the sphere, passing the North Pole at the constellation Andromeda, through Perseus, the eastern part of Taurus and Orion, crossing the equinoctial, and passing east of Canis Major, and within 20° of the South Pole; then on to Sagittarius, a little south of which it divides into two parts; passing through Sagittarius, crossing the equinoctial again, one part in Aquila, the other in Ophiuchus, east of Lyra, into Cygnus, in the north part of which it reunites, and thence on to Cassiopeia and Andromeda. The appearance of this belt, to the naked eye, is such as to lead to the belief that it is one entire mass of stars, too minute to be distinctly seen. This opinion is fully confirmed by the telescope. One of the most important theories concerning the stars, is intimately connected with this zone, and on that account it is entitled to a thorough consideration; but want of room compels me to refer you to article Star, where it has received a passing notice.

VIRGO : the Virgin, a constellation of the zodiac, situated between Leo and Libra. The star Spica, of the 1st magnitude, in the southern part of this constellation comes to the meridian at 9, May 27. It is about 34° southwest of Arcturus, and is near the ecliptic, on the south side. The position of the other stars may be learned from the picture.

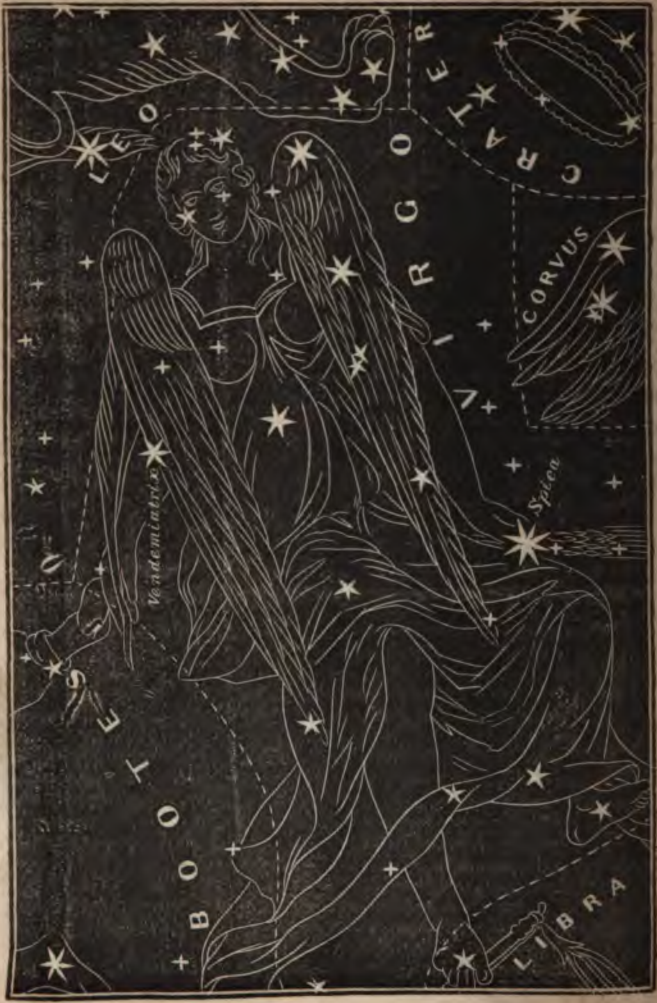
Y.

YEAR ; the period in which the earth performs its revolution about the sun. See Earth.

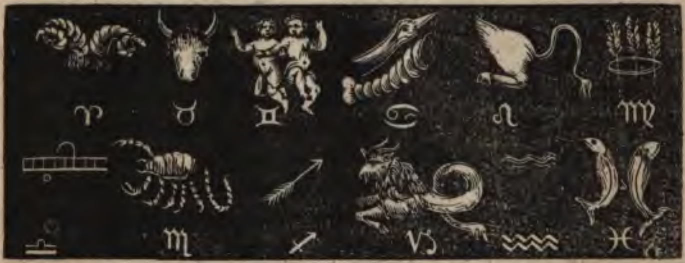
Z.

ZENITH : that point in the sphere directly over our heads.

ZODIAC : an imaginary belt or zone of the sphere, which em-


LEO
VIRGO
CRATER
CORVUS
Vendemiatrix
Spica
BOOTES
LIBRA

braces the orbits of all the larger planets, and which is the area or field on which they perform their revolutions about the sun. This zone is about 18° in breadth, the ecliptic lying in the middle of it throughout, and having 9° of it on each side. The zodiac is divided into twelve equal parts, of 30° of longitude each, which have been already considered in article Ecliptic. The characters by which they are known are probably rude hieroglyphics, representing the zodiacal constellations, which once corresponded to the signs. The resemblance may be seen by referring to the picture.



Here it is evident that this character ♈, was intended to represent the horns of the Ram; ♉, the head and horns of the Bull; ♊, the Twins; this character ♋, was probably intended to represent the tail of the Crab, and the head of the Egyptian Ibis, as it is represented in ancient constellations, or perhaps the claws of the Crab to which the resemblance is more striking; ♌, no doubt represents the tail of the Lion; ♍, may have been intended for ears of wheat, which the Virgin was represented as holding in her hand; ♎, is the beam of a balance; ♏, was probably intended for the legs and tail of the Scorpion: ♐, is the arrow of Sagittarius; ♑, is the goat; ♒, represents the waving surface of water, for Aquarius, the Water Bearer; ♓, the two Fishes.

CONCLUSION.—HISTORY OF ASTRONOMY.

Hitherto our course has lain along a plain matter-of-fact sort of path, where there has been little opportunity of wandering from a well known and beaten track, or temptation to indulge in theorising and speculation. So far, all lies open to the broad day-light, giving us, all along, the power of proof and demonstration. Now, in attempting a history of the science of astronomy, and tracing its progress from the earlier times to the present, we must grope much of our way in the obscurity and darkness which hangs over its infancy, depending on the fabulous fancies of the ancients, and what is sometimes little better, their science and history.

The more prominent features of astronomy must have engaged the attention of the fathers of the human race. The sun, moon, and stars, and their apparent diurnal and sidereal revolutions, are objects that could not have met an incurious and disinterested gaze from the earliest and most unenlightened settlers of the antediluvian world. What their opinions may have been regarding the nature of the heavenly bodies, we have no means of knowing. Milton represents Adam and Eve in a hymn of praise, as contemplating the sun, moon, stars, and planets.

Josephus says that God indulged the antediluvians with a life of centuries, that they might bring the science of astronomy and geometry to perfection. We can readily suppose that men living nine hundred years, daily watching the appearances and motions of the celestial orbs, and year after year, through a period that finds the planet Uranus returning a dozen times to the same star, adding something to their stock of astronomical knowledge, would have great advantages for perfecting the science over the present race of men, whose lives rarely see the completion of this planet's year; but to say they lived through such a period on account of astronomy and geometry, is giving those sciences an importance they are not entitled to. There were other sciences to be attended to, the earth was to be tilled, dwellings were to be made, intercourse between man and man was to be regulated and reduced to system: in short, arts and sciences in some state, must have existed then, and required the gradual and constant improvement, developement, and experience of successive ages.

The same historian also says, that Seth and his descendants were persons of happy tempers, and lived in peace, employing themselves in the study of astronomy, and in other searches after knowledge. To preserve to posterity the knowledge they had acquired, they erected two pillars, one of brick, the other of stone, and inscribed on them the result of their observations. The stone pillar remains in the land of Seriad to this day; on it is inscribed an account of the other of brick.

It is unnecessary to add, that no reliance can be placed on such accounts; and that while we suppose the earliest ages produced their astronomers, we must give up all hope of ever being able to learn much as to the extent and degree of perfection of the science as it existed for many ages after the flood. Of antediluvian astronomy we can know nothing.

Uranus is said by the heathen writers to have been the most ancient astronomer: he was the father of Saturn, and son of Ge, the earth. Many of the heathen fables are thought to have reference to astronomy. The story of Atlas supporting the world, is supposed to perpetuate his name as an astronomer. Prometheus, his brother, was chained to a rock on the top of mount Caucasus, exposed to a ravenous bird, which constantly preys upon his vitals. This has been thought the poetical image of a philosopher wasting his spirits on the mountain, in the study of the stars.

The Chaldeans point to their temple of Belus as an astronomical observatory, and proof of the great antiquity of the science among them. They say it was built by

Semiramis, their Zoroaster, five thousand years before the destruction of Troy, or about eight thousand years ago; yet, when Alexander took Babylon, about six thousand years after this period, Calisthenes inquired for the observations of the Chaldeans, and found that they extended but one thousand nine hundred and three years back, about the time of the building of Babel. Among them eclipses were recorded which happened two thousand five hundred and fifty-six years ago. The Chaldeans are said to have found the length of a lunation to be twenty-nine days, twelve hours, forty-four minutes, and seven seconds; and the moon's sidereal period to be twenty-seven days, seven hours, forty-three minutes, and thirteen seconds, both of which are within a few seconds of the truth. Aristotle says, they had made observations on the occultation of stars by the moon, from which they concluded that an eclipse of the sun was caused by the moon. Diodorus Siculus says, they observed comets which they held to be material bodies like the planets, but moving in more extensive orbits. He also says, that the southern parts of Arabia are made up of sandy plains of a prodigious extent; the travellers through which, direct their course by the *Bears*, in the same manner as is done at sea. It seems, then, that some of the constellations had then been formed. The Phœnicians are supposed to have been the first who sailed by the stars. He supposes also that the Chaldeans were acquainted with the obliquity of the ecliptic, and that they were the inventors of dials. They also made thirty-six constellations, twelve in the zodiac, and twenty-four without. They observed that the sun completed the tour of the zodiac in a year, the moon in a month, and that the planets had their several periods. They found the moon's path in the sphere to be within those of all other celestial bodies, and consequently that she was nearest the earth. They had found the civil year to consist of three hundred and sixty-five days, and a quarter, and the sidereal year of three hundred and sixty-five days, six hours, eleven minutes. They had also formed an approximate idea of the true magnitude of the earth, for they say that a man walking constantly at a good rate, may follow the sun round the earth, or make the tour of the earth in a year. Now to perform the journey (26,280 miles) in this time, would require about three miles an hour, which may be considered a tolerably fair rate of walking. The period called the Chaldean saros, which they had assigned for the revolution of the moon's nodes, was eighteen years fifteen days and eight hours, or two hundred and twenty-three lunations.

These things, especially when we consider their want of proper instruments, are very creditable to the Chaldeans, and evince a degree of industry and research worthy the ardor and devotedness with which they gave themselves up to the study of the science. There must be a dark side to every picture, and we must shade this, by saying that they made the luminous science of astronomy subservient to the occult one of the *black art.* For this, they were so famous, that those of all nations who foretold future events by observing the positions of the stars and planets, were called Chaldeans.

It was during this period that Hezekiah being sick, required a sign in token of his recovery; accordingly the shadow went back ten degrees on the dial of Ahaz; that is, the sun in its apparent diurnal course, went back forty minutes. This was noticed at Babylon, from whence messengers were sent to Hezekiah, to inquire respecting the phenomenon.

The Egyptians do not seem to have been behind their cotemporaries, the Chaldeans, in the science, for Diogenes Laertius says, that they had in their annals accounts of three hundred and seventy-three eclipses of the sun, and eight hundred and thirty-two of the moon, prior to the time of Alexander the Great. The probable length of time requisite for seeing this number of eclipses from the same horizon, must have been twelve or fourteen hundred years; though the Egyptians, to give an appearance of great antiquity, assigned them the period of 48,863 years. Moses was said to have been learned in all the wisdom of the Egyptians; from which it would seem, that they were noted for a considerable degree of perfection in the sciences. Diogenes Laertius says, they believed the earth to be spherical, and that the moon was eclipsed by passing through the earth's shadow; he also says, they made their observations with great exactness, that they predicted the return of comets, and could foretel earthquakes and inundations, &c. From this we may see that the accounts of the ancient writers are only to be received after making a large allowance for that lee-way of authors, a desire to make of their stock of materials the greatest possible story.

More than 4,000 years ago, it is said, the Chinese had invented a sphere, and the various circles belonging to it; they had discovered the precession of the equinoxes, which they calculated at 54″ a year, which would make the entire revolution in 24,000 years. They had determined the obliquity of the ecliptic, and had constructed tables showing the increase and decrease of the length of the days from the change of the sun's declination for different latitudes. The Bramins supposed the earth to be in the centre of the world, with the planets revolving about it.

From the many Greek fables which has been connected with the history of the constellations, one would suppose we might look to the ancient Greeks for many celebrated astronomers. They seem, however, to have been very much behind other nations in the cultivation of this science, it being agreed that they first borrowed their knowledge of it from the Egyptians and Chaldeans, and afterwards made little progress in it until the time of Thales, who lived about 2,400 years ago. This philosopher foretold the year in which an eclipse of the sun was to happen. He is said to have found the diameter of the sun to be half a degree, to have been acquainted with the zodiac, and its obliquity to the equator, to have computed a calendar containing the times of the rising and setting of the stars, and to have formed the constellation of the *Lesser Bear*. He travelled into Egypt for improvement, and while there measured the height of the pyramids, by observing the length of their shadows, and the altitude of the sun.

Anaximander, scholar and successor of Thales, is said to have taught that the earth is a sphere and in the centre of the world, that the moon borrows its light from the sun, and that the sun is not less than the earth. Soon after this, Anaxagoras predicted an eclipse of the sun. He taught that the moon was inhabited, and had plains, hills and water, as the earth has.

Pythagoras lived at this time. He is said to have taught that the earth is in the centre of the world, with a diurnal motion, that the moon is next it, then the sun, and then the orbits of the planets. He supposed the *Milky Way* to consist of a great number of small stars. He is also thought to have been the first who taught that the *morning* and *evening star* (Venus) were the same planet. He thought the earth a sphere inhabited on all sides. Philolaus, his disciple, taught the true system, placing the sun in the centre, with the earth and planets revolving about it. Pythagoras is thought also to have taught the true system, or at least to have fallen in with the opinion of Philolaus before his death.

After this, something should have been expected from Plato and Aristotle, yet we find that astronomy owes little or nothing to these philosophers. Eudoxus, a scholar of Plato and cotemporary of Aristotle, was by Cicero called the prince of astronomers. He first applied geometry to the science, and had he not been fettered by the rules of the Platonic school, it is supposed he would have done much for its advancement. Much to his honor, he was a great enemy to astrology. He flourished nearly 2,200 years ago.

After this comes Aristarchus. He seems to have thought that the distances of the stars were beyond comparison, greater than that of the sun.

The next celebrated astronomer was Eratosthenes of Athens. He was invited to Egypt by Ptolemy, where he did much for the advancement of the science. He determined the obliquity of the ecliptic to be 23° 51′ 20″.

Archimedes, of Syracuse, the great philosopher and mathematician, was also a great astronomer. He lived nearly 2,050 years ago.

Hipparchus, who lived nearly 2,000 years ago, set about the study of the science in earnest, seeming determined to leave no part of it untried. His zeal and industry placed him far above those who had gone before him, and he is now considered the father of astronomy. He verified the obliquity of the ecliptic observed by Eratosthenes, which he found very correct. This is of great importance, as it shows that the obliquity is decreasing. He first discovered that the orbit of the earth is not a perfect circle, but an ellipse, by observing that the motion of the sun was not uniform through the whole year, and from the same data discovered the principle of the equation of time, making it, however, much too large. He discovered the precession of the equinoxes, the inclination of the moon's orbit to the ecliptic, and the true principle of the moon's parallax. It is also thought that he determined the mean motions of the planets. A new star having appeared in his time, he formed a catalogue of the fixed stars, so that posterity might know whether any changes had taken place among them. His catalogue contains the latitudes, longitudes, and apparent magnitudes of 1,022 stars.

From his time, little was done for the advancement of astronomy, until the time of Claudius Ptolemy, who was born 1,767 years ago. Like Hipparchus, he attended to all parts of the science, and in his book, called the almagest, or *the great composition*, he treats of the spherical figure of the earth, but erroneously supposes it at rest in the centre of the universe; of the habitable parts of the earth, and the nature and positions of its circles; of the true length of the solar year, the unequal motion of the sun in the ecliptic, and the unequal length of the days and nights; of the lunar motions, giving tables for computing them; of the eccentricity of the lunar orbit; of the magnitudes and distances from each other, of the sun, moon, and earth; of the conjunctions and oppositions of the sun and moon, the limits of solar and lunar eclipses, with tables for computing the times in which they are to happen; of the fixed stars, describing the constellations by means of an artificial sphere, rectifying their places to his own time, showing how different they then were from what they had been in the times of Timocharis, Calippus, Hipparchus and others, and giving a catalogue of the stars of the northern hemisphere, another of the southern hemisphere, and another of the zodiac; of the *Galaxy* or Milky-way; of the rising and setting of the sun and stars; of the order and periodical revolutions of the planets, with tables of their mean motions; of the various phenomena exhibited by the planets Mercury, Venus, Mars, Jupiter, and Saturn, as seen from the earth; of the stationary and retrograde motions of the planets, their latitudes, the inclination of their orbits to the ecliptic, their risings, settings, &c.

This great work contains not only the result of his own labors, but all of consequence of Hipparchus and others, who had gone before him. It was translated from Greek into Arabic about 1,000 years ago, and into Latin about four hundred years afterwards.

From the year 800 of the Christian era, for a period of five hundred years, during which a cloud of intellectual darkness, barbarism, and popish sway hung over Europe, the Arabs, Persians, and Tartars are entitled to the honor of all that was done for the advancement of the science.

About the year 820, Almanon, an Arabian astronomer, and others, determined the obliquity of the ecliptic to be 23° 34′.

Albategnius, an Arabian, who flourished about thirty years after, was the greatest astronomer after Ptolemy. He found the lunar and planetary tables of Ptolemy defective, and constructed new and more correct ones. From his observations the obliquity of the ecliptic is deduced to have been 23° 35′ 47″.

Alhazen, an Arabian, who lived about eight hundred years ago, wrote a treatise on the twilight, showing that it commenced and ended when the sun was 19° below the horizon. He also computed the height of the atmosphere to be 51.8 miles, and wrote a treatise on optics in which he explained the true principles of refraction, and gave a method of finding its quantity.

From this time down to the fifteenth century, we find the names of many learned astronomers, who each in his turn added something to the labors of those who had gone before.

Ulugh Beigh, a prince of Tartary, and grandson of the famous Tamerlane, or Timour the Tartar, flourished about four hundred years ago. He is said to have had very large instruments, and to have determined the celestial motions with greater accuracy than any that went before him. His quadrant was one hundred and eighty feet high. He was put to death by his own son.

It is to the Arabians we are indebted for the present form of trigonometry, and in fact, for the revival of learning in Europe; for in the ninth century they made their way into Spain, and by their intercourse with all the western parts of Europe, communicated a knowledge of astronomy, which had been so long lost to that part of the world.

In the thirteenth century, Frederick II, emperor of Germany, and Alphonsus X, king of Castile, encouraged the study of this science, and greatly contributed to its advancement. From this time to about 1500, we find the names of Purbach, a German, Blanchinus and Dominic Maria, Venetians, John Muller, Bernard Valther, and John Verner, Germans, as eminent astronomers.

We now come to Nicholas Copernicus, who was born at Thorn, in Prussia, January 19, 1472. This illustrious astronomer having become acquainted with the principles of the science from the works of those who had gone before him, and admiring the talents and reputation of Muller, determined to give up his whole life to the study of the science. After examining the systems that had been formed, he rejected the notions of Hipparchus and Ptolemy, which supposed a circular motion of the planets about the earth, and adopted those of Philolaus and Nicetas, which suppose the sun in the centre of the universe, and the earth as having a rotation about its axis, which led to his forming the system which now goes under his name.

'I have,' says he, 'by long and frequent observation, discovered that if the motions of the other planets be compared with the revolution of the earth, and be estimated according to the time in which these bodies perform their revolutions, not only their several appearances will follow from this hypothesis, but it will also so connect the order of the planets, their several orbits, their magnitudes, distances, and even the apparent motions of the fixed stars themselves, that it will be impossible to remove any one of these bodies out of the place which is assigned it, without disordering the rest, and the whole universe also.' He defined gravity as 'a certain natural desire given by the Supreme Being to all the parts of matter, by which they tend to unite under the form of a globe.'

Tycho Brahe, a very eminent astronomer, flourished about seventy years after Copernicus. While the science owes much to his labors, it must be regretted that he endeavored to destroy the Copernican system and establish one of his own, and that he was given to the observations of omens, and a belief in astrology.

John Kepler, the most sagacious astronomer perhaps that has ever lived, was born at Wirtemberg, about the year 1530. Supporting the system of Copernicus, he determined that the orbits of the planets were not circles but ellipses, and that the sun is one of the foci of the several orbits. He determined the laws by which the distance from the sun, the periods, and motions of the planets were regulated, and which have ever since been known as Kepler's laws. Of gravity, he entertained the same opinion with Copernicus, whose definition of it, is perhaps the best that has been given. He also had a just notion of the proportion, force or quantity of gravitation exerted mutually between the sun and planets, so that it is difficult to understand why *all* the honor connected with the theory of gravitation, has been accorded to Sir Isaac Newton.

We now come to a period when the science received a new and powerful impulse in the aid of the telescope. The honor of first applying this instrument to the purposes of astronomy, belongs to Galileo, who was born at Pisa Feb. 15, 1564. According to his own account, he made an instrument which magnified more than thirty times. After amusing himself by trying its effects with terrestrial objects, he first directed it to the moon, and discovered the shaded spots, now so well known, which convinced him that its surface was not smooth, but diversified with mountains and vallies, like the earth. He also found that Venus assumed phases similar to those of the moon. He discovered the satellites of Jupiter, and it may be said, the ring of Saturn; though from the small power of his telescope he had no idea of its being a ring. He discovered spots on the sun's disc, and from their motion across it, concluded that this immense body had a rotation on its axis.

After having discovered Jupiter's satellites, he conceived the idea of determining the longitudes of places on the earth by their eclipses. He also discovered that the Galaxy, and some nebulous spots, were made up of an infinite number of stars.

For his damnable heresy of supporting the Copernican system, he was persecuted by the Pope, thrown into prison, and finally compelled to recant his opinions. This is the most painful picture, and forms the blackest page, that is to be found in the whole history of astronomy. We can laugh at the ridiculous figure that kings must have made in kissing the pope's great toe, or in holding the stirrup whenever his holiness mounted his horse; we may read the terrific excommunication against 'the Devil, the Comet, and the Turk' —and who cares? but to see the gray head of old Galileo, in all the pride and consciousness of the splendid talents he had devoted to the cause of such a science, through fear of the stake, bowed down before the shrine of stupid ignorance and superstition, and his knees bent to the work of sacrificing the opinions, for which he had so long and arduously toiled, to the bigotry of a triple-crowned fool—we turn from the picture with loathing and disgust, and a feeling of resentment that tingles to our fingers' ends.

This great astronomer died January 8, 1642, or near two hundred years ago.

Hevetius and Huggens, with more powerful telescopes, followed the steps of Galileo. The former gave an accurate representation of the moon's surface, and the latter discovered one of the satellites of Saturn, and explained the various appearances of his ring.

John Dominic Cassini, with still more perfect instruments, discovered the rotation of Jupiter, Mars, and Venus, and four of the satellites of Saturn. He also discovered the dark line which shows the ring to be double. He died Sept. 14, 1712.

John Flamsteed, the celebrated English astronomer, was born at Derby, August 19, 1646. He was the first *Astronomer Royal*, a title borne by those appointed to the charge of the royal observatory at Greenwich. Dr. Halley's tables, and Sir Isaac Newton's theory of the moon, were founded on his observations. He made a catalogue with the places of 2,884 stars, which is still the best extant. The latter part of his life was rendered unhappy by the vexatious persecution of Newton and Halley, who in a most unprincipled manner made use of his labors for their own benefit. This great astronomer died Oct. 31, 1719.

Sir Isaac Newton, the founder of physical astronomy, was born Dec. 25, 1642. He explained the law of attraction, and showed how it would solve the motions and phenomena of the different bodies of the solar system, and the same principles have been since further applied, and shown to be competent to account for all the motions of the heavenly bodies. Without detracting from the merits of others, who had gone before him, to whose hints and labors he certainly stands greatly indebted, he may perhaps be considered as great as any philosopher that ever lived. But even to the brilliant character of this great man, there must be a dark shade. His weakness in suffering himself to be made the tool of the infamous Halley, in the unjust persecution of Flamsteed, excites mingled feelings of pity and disgust, and should caution us against yielding unqualified homage to the talents of any man, however brilliant they may have been, or of placing him far above his fellow-men, whatever success may have attended his labors. Newton died March 10, 1727.

After the notice taken of Dr. Edmund Halley, in the account of Newton, it may be difficult to speak of him according to his merits. He was an eminent astronomer, of great research and sagacity, and while comets occasionally blaze forth in the heavens, his name can never be forgotten.

The celebrated French astronomer M. de la Lande has greatly added to the science; it may in fact, be considered as having passed through his hands, it being left greatly improved and more highly finished throughout.

To mention the labors of Dr. Herschel would alone require a volume. He died August 25, 1822, at the age of eighty-five. His discovery of a new planet (Uranus) and its satellites, is alone sufficient to perpetuate his name to the latest posterity.

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